JANUARY 25, 1958
VOL. 154 — NO. 4

Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY

WHITE ALICE PROJECT

White Alice, military and civilian communications system, has 3,000 route miles of telephone and telegraph circuits covering Alaska. Above is the station at Diamond Ridge. See page 20.

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ABC Guaranteed Circulation This Issue 12,300 of Which 11,744 Is Paid

ELECTRONICS SECTION — Page 41

MANAGEMENT • PLANT • TRAFFIC • COMMERCIAL • LEGAL • ACCOUNTING

● PROTECTED...With new, transistorized Stromberg-Carlson "561" Subscriber Carrier you get built-in protection against extremes of heat and cold, storms, lightning -- even stray shots from hunters' guns! The system operates under extreme weather changes without readjustment of line levels. Automatic gain regulation

adjusts over a range of 15 db. You get high quality transmission with line losses even up to 35 db. Get all the facts about "561" Subscriber Carrier by calling or writing your Stromberg-Carlson representative.

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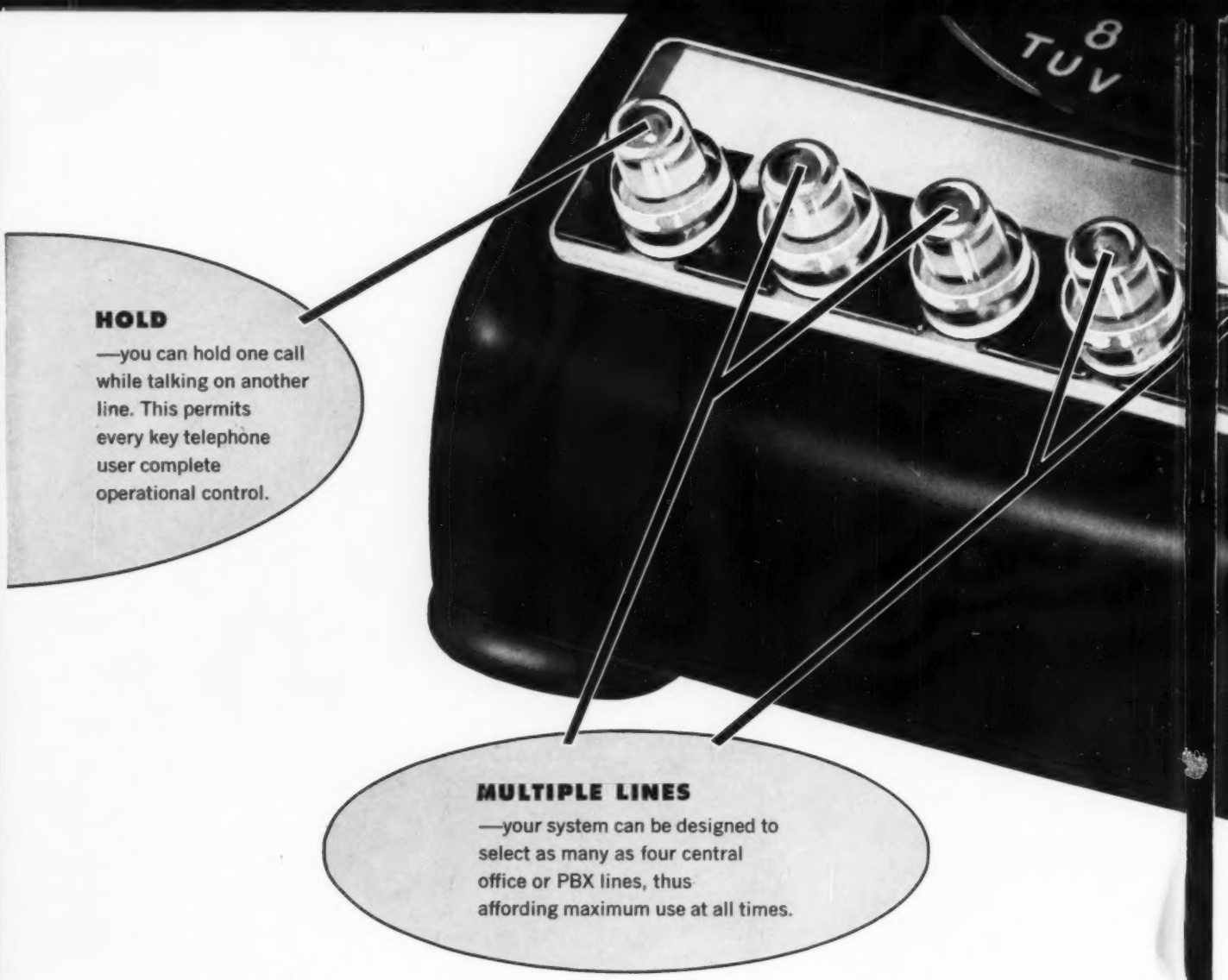


HOLD
—you can hold one call while talking on another line. This permits every key telephone user complete operational control.

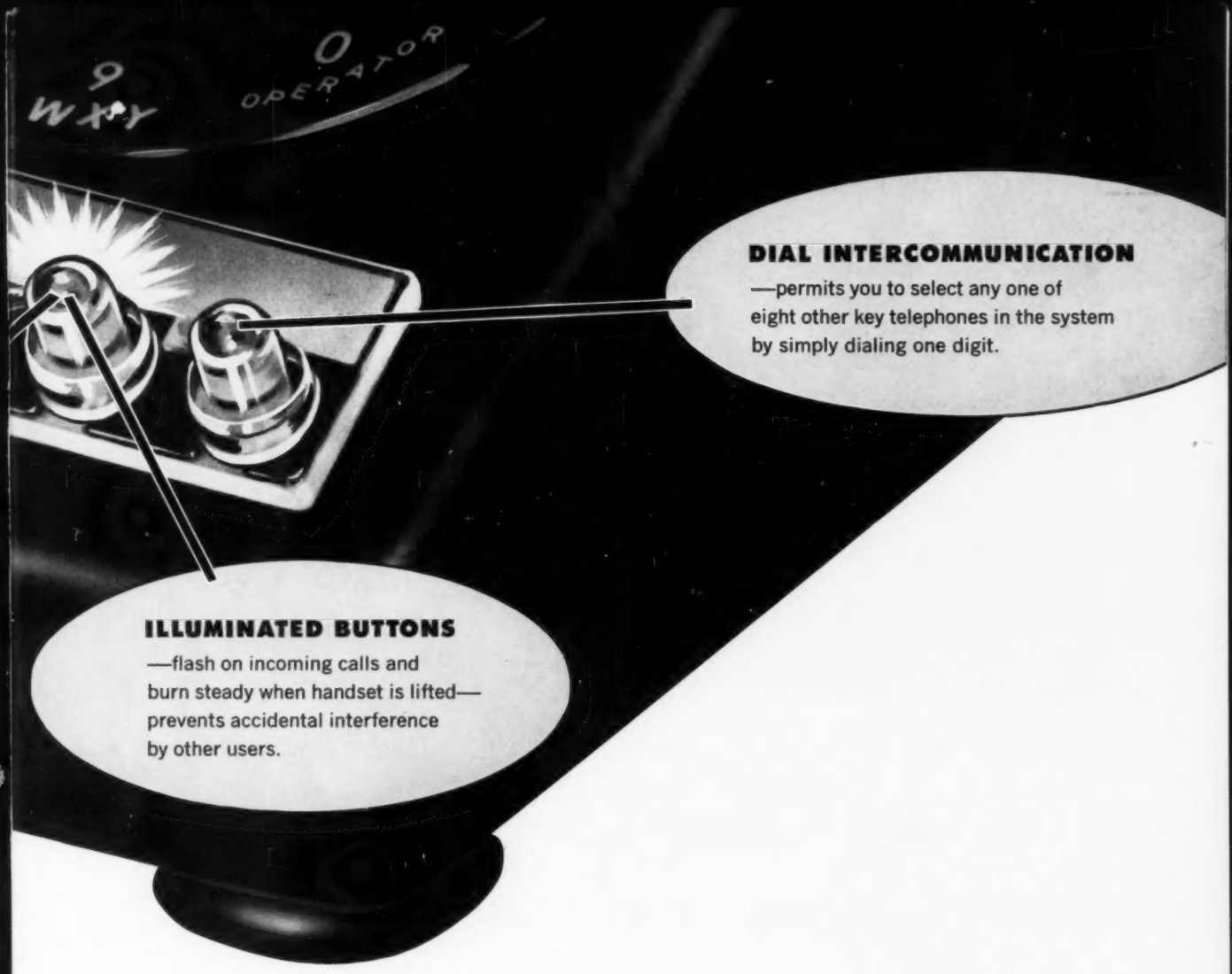
MULTIPLE LINES
—your system can be designed to select as many as four central office or PBX lines, thus affording maximum use at all times.

IT'S THE BIG

It's BIG saleswise. *1A1 Type key systems are selling faster than any other type in the nation. Subscribers in independent areas want the best, too, and they get it with the K1A1.*

It's BIG featurewise. *Kellogg's K1A1 has all the important features which have made 1A1 systems so popular, including dial intercommunication, and illuminated buttons.*

But it's SMALL in size and cost. *The K1A1 key systems is engineered to be easy to install. It occupies a minimum of wall space. And it's rugged equipment . . . maintenance calls are reduced to a minimum.*


9 WAY
0 OPERATOR
DIAL INTERCOMMUNICATION
—permits you to select any one of eight other key telephones in the system by simply dialing one digit.
ILLUMINATED BUTTONS
—flash on incoming calls and burn steady when handset is lifted—prevents accidental interference by other users.

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A Lorain Telephone construction crew checks over the day's assignment. Not only new construction and maintenance, but work designed to improve existing service is kept on schedule because the Lorain Telephone Company constantly plans ahead.

How Lorain Telephone grows through forecasts of community expansion

Early planning and accurate timing have enabled this progressive independent telephone company to anticipate growth in the Lorain, Ohio, area.

In January, 1940, the Lorain Telephone Company of Lorain, Ohio, had 9,229 subscribers. Today the company has over 37,000. This substantial and steady growth has been well deserved, for it has been based on a sound plan. Lorain Telephone Company executives project the coming needs of their territory and base their plans for inside and outside plant expansion on intimate knowledge of residential, commercial and industrial growth.

Lorain Telephone men watch the plans of industry to locate large and small plants in their territory. Long experience in the community helps these telephone experts to chart the growth of residential developments and service businesses which inevitably follow the opening of new plants. By the time the need arises for additional telephone service, the required equipment is already on order and construction work scheduled.

Caught by the camera at the storeroom of the Outside Plant Department are M. A. (Bud) Fout, (center) Superintendent of Material and Supplies for Lorain, George Ostrander, (left) Graybar Telephone Specialist; and R. H. Vollmer, (right) Graybar Sales Representative. These frequent huddles help keep Lorain inventory in balance.

President Herman E. Hageman, pictured here with his son, James C. Hageman, Vice President, earned his B.S. degree at Ohio Wesleyan in 1903. President Hageman has been in telephone work continuously since his graduation. He has found time, in addition, for distinguished work with the Defense Communications Board and to serve the Ohio Independent Telephone Association as president for 3 years. Recently Mr. James Hageman received for the Company one of the annual Community Service Award Plaques presented by the O.I.T.A.

"We like to do business with Graybar because we get what we need and we get it on time. We know that Graybar, like ourselves, anticipates the needs of customers . . ."

Says James C. Hageman, Vice President of Lorain Telephone Company

Typical of the special installations Lorain makes for its customers is the USI Type 30-B PABX supplied by Graybar and installed at the Lorain Banking Company's main office. Shown here are Adele Zlotnicki at the attendant's cabinet; Gerald West, Lorain Telephone Company Service Engineer (right); and Robert Vollmer, Graybar Sales Representative (center).

Fred Gerber, superintendent of outside plant for Lorain, adds that delivery promises made by Graybar can be depended upon. Also, Mr. Gerber looks to George Ostrander, Graybar Telephone Specialist, for up-to-the-minute product information.

"The construction schedules of our company have been, and are being met," says Mr. Gerber, "in large measure by the fine cooperation we receive from outstanding suppliers, like Graybar."

We at Graybar are proud of our long association with Lorain Telephone Company, one of the many fast growing firms in the vital field of independent telephony. Graybar, too, is an independent company . . . wholly owned and managed by its operating and retired personnel. You get *personal* service from people who have a *personal* interest in giving you the assistance you need . . . when you need it.

Through more than 130 Graybar offices and warehouses, we are serving the independent telephone companies of this country with pole line supplies, central office equipment, subscriber carrier and toll circuit carrier, linemen's tools and safety equipment, poles, conduit and booths — besides providing fast, convenient service on over 100,000 electrical items. For anything and everything electrical, call Graybar *first*.

748-231

Call Graybar first for...

Everything Electrical

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QUALITY

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ELECTRIC COMPANY

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GRAYBAR ELECTRIC COMPANY, INC.
420 Lexington Avenue
New York 17, N.Y.

IN OVER 130 PRINCIPAL CITIES

FLASHES AND PLUGS

HE NEEDS A DOCTOR. The brother of a Milwaukee, Wis. woman—professor in a southern college, according to the Milwaukee *Journal*, recently had to make a hurryup trip to Milwaukee.

The fastest way was an air flight to Washington, D. C., and from there to Milwaukee. The problem: How to get an immediate reservation during the busy holiday season.

Over the years the professor, who has a doctor of philosophy degree, has discovered that he can get much more service and attention if he identifies himself as "doctor," which he has a perfect right to do.

So he telephoned the air line office in the college town, identified himself as Dr. So and So, and explained that he had to make an emergency trip. There was a hesitation at the other end of the line.

"Are you a medical doctor?" the reservations clerk finally asked.

"An obese schizophrenic," he assured her.

The clerk thought that over for a moment. Then the professor heard her talking excitedly to someone in the office.

"I've got a very important doctor on the line who has to get to Washington in a hurry!" he heard her say. "We've got to get him on the next flight."

When his Milwaukee sister learned of his ruse, she was horrified.

"You could get yourself into trouble," she protested.

"I doubt it," the professor said. "At least not for calling myself a fat madman."

•

TOO MANY LATE MOVIES. In Syracuse, N. Y., a policeman rushed to the scene after a frantic five-year-old girl called.

He arrived at the house and put the little girl and her younger sister and brother at ease by waking up the snoozing baby sitter, *their* father.

•

LOVERS LANGUISH LINELESS. An extra telephone line has been applied for by a hospital in Gateshead, England to enable 20 young student nurses to exchange telephone calls with their boy friends.

•

THURE HE DID. When a reporter on a Midwestern paper telephoned in a story about a farmer's loss of 2,025 cows in a barn fire, an alert copyreader thought the figure pretty high and called the farmer to check on it.

"Did you lose 2,025 cows in a fire? he asked the farmer.

The distraught farmer answered: "Yeth."

So the smart newsman thanked him and changed the story to read two sows and 25 cows.

CHANGE OF ADDRESS

Please notify your local postmaster and the Circulation Dept. of TELEPHONY of change of address. Change cannot be made without the old as well as the new address. Allow three weeks for change of address to become effective.

Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY
Since 1901

January 25, 1958

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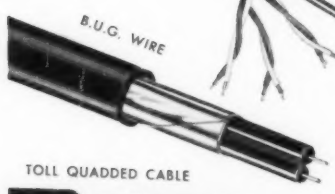

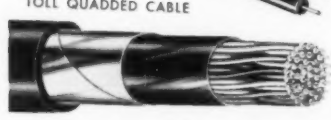

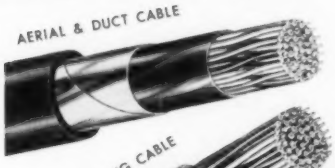

Providing the right cable for the right job can be a new problem in every independent telephone installation. That's why so many independent companies depend on Ansonia's engineering staff whenever wire or cable is involved.

Ankoseal cables are sold to independent telephone companies through authorized Telephone Supply Distributors only.

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Oooh

—so light. . . .

OOOH—SO RIGHT. . .

Is the Ericofon as light as a balloon? Well—not *really*, but it is so light as to give an impression of almost complete weightlessness!

The outstanding design of the one-piece Ericofon has resulted in a balance that makes holding and using the Ericofon virtually effortless.

Yes, using the Ericofon is easy as "child's play," and the "dial-comes-to-you" feature further enhances the advantages of the Ericofon.

Truly—the Ericofon is "Oooh so Light."

And in beauty, charm, and convenience, the Ericofon is "Oooh so Right."

You may offer your subscribers the Ericofon—it is available to you in six charming colors—available to you only from NORTH.

NORTH ELECTRIC COMPANY

601 SOUTH MARKET STREET • GALION, OHIO

The West Central Telephone Association is located right in the center of what many people consider the best hunting and fishing country in Minnesota. Phillip E. Richards, manager, looks on as one of his men collects coins from one of the Alcoa® Aluminum Outdoor Telephone Booths the company maintains in Sebeka, Menahga and Verndale, Minn.

"FOUR TIMES MORE REVENUE WITH ALCOA BOOTHS,"

Reports Phillip E. Richards of West Central Telephone Association

West Central Telephone Association of Wadena, Minnesota, proved to itself that it really pays to make it more convenient for people to get to a phone. Formerly, vacationers in the resort towns of Sebeka, Menahga and Verndale, Minnesota, had to go to the local telephone office to make calls home, unless there was a phone where they were staying.

Phillip E. Richards, manager, decided to install Alcoa Outdoor Booths in these towns. When he did, revenue shot up to a figure more than four times greater than before. In the month of July, one booth brought in $245.00. Another booth made $1,831.00 its first year.

West Central likes the wide-opening doors of the booths and the internal roominess—about eight square feet of floor space. The shelf provides ample space for packages or handbags. Manager Richards found his men were able to assemble a booth and erect it on the site in about six hours.

"MAINTENANCE IS NO PROBLEM," says manager Richards. "We pay a nominal fee to the people near whose property the booth is installed to provide electricity and maintenance. The only work required is occasional sweeping out with a broom and infrequent washing with soap and water."

"THEY ARE AS STRONG AS A BRIDGE," says Phil Richards. "When I saw how these Alcoa Booths are built, with four corner columns like the box girders on a bridge, I knew they could take it. We had trouble with another booth we tried. These Alcoa Booths are really vandal resistant."

SEBEKA, MINNESOTA — 1956

Jan.	Feb.	Mar.	Apr.	May	June	
107.58	112.05	114.73	184.54	175.87	146.57	
July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
208.06	239.81	183.52	111.14	137.30	109.85	$1,831.02

MENAHGA, MINNESOTA — 1956

Jan.	Feb.	Mar.	Apr.	May	June	
93.49	81.84	65.02	94.29	122.10	165.01	
July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
245.04	190.65	156.00	142.48	133.11	73.76	$1,562.79

VERNDALE, MINNESOTA — 1956

Jan.	Feb.	Mar.	Apr.	May	June	
58.84	46.94	20.98	47.42	49.06	65.45	
July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
74.15	88.79	85.59	73.66	70.05	57.12	$738.05

1955 TOTALS — PRIOR TO INSTALLATION OF ALCOA BOOTHS

SEBEKA — $412.50 **MENAHGA — $361.70** **VERNDALE — $212.00**

"HERE'S HOW MUCH OUR BOOTHS EARN," reports Phillip E. Richards, manager, West Central Telephone Association. "Contrast the totals for the towns of Sebeka, Menahga and Verndale, Minnesota, with the totals at the bottom which show revenue obtained *before* the outdoor booths were installed."

"BOOTHS ARE BRIGHTLY LIGHTED," reports Mr. Richards. "The fluorescent lamps provide a lot of light through the four glass 'Telephone' signs at the top, and through the ceiling on the inside. This is important not only in attracting attention to the booths at night but in making the ladies feel comfortable inside."

ALCOA GOODWILL KITS are furnished with every Alcoa Booth. They contain newspaper mats, publicity releases, free envelope stuffers, radio and TV commercials.

GET MORE INFORMATION ON ALCOA BOOTHS. Write for brochure. And ask your jobber how Alcoa Booths can increase your revenue and build customer goodwill. ALUMINUM COMPANY OF AMERICA, 1690-A Alcoa Building, Pittsburgh 19, Pa.

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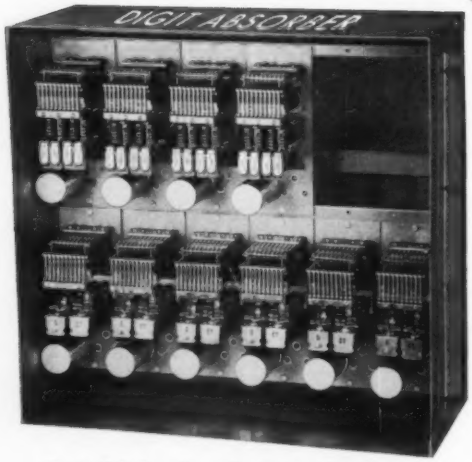
2-5 DISTANT DIALING?



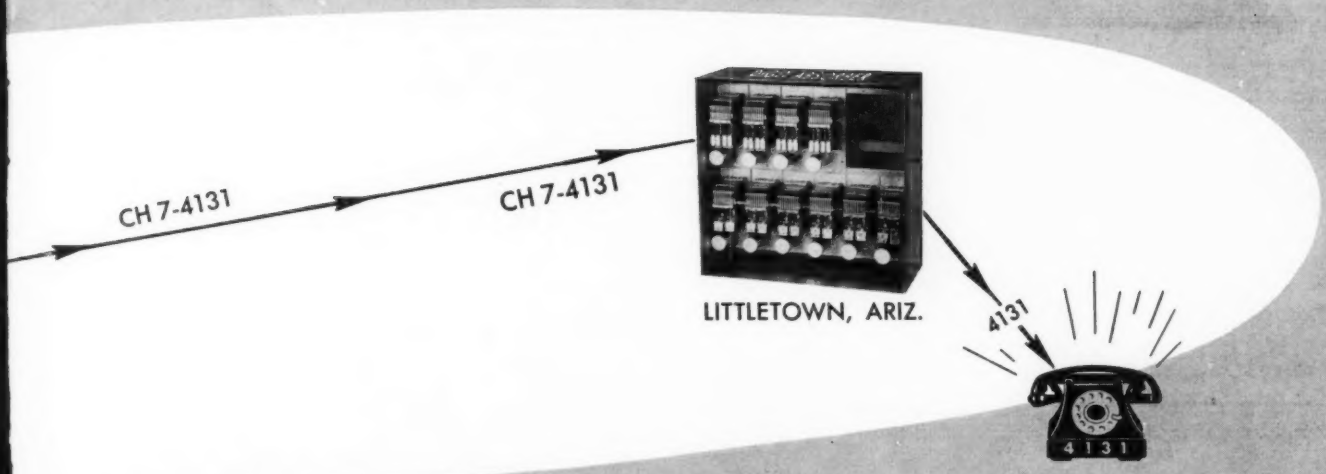
Typical Relay Case for Digit Absorber.

The Universal Digit Absorber employs simple circuity with a magnetic impulse counter, together with other standard relay apparatus of recognized manufacture.

Other UNIVERSAL Telephone Equipment:
Code-to-Selective RINGING CONVERTER
COMPUTER INTERCEPT

INDEPENDENT

It can with a UNIVERSAL DIGIT ABSORBER*



DIRECT DISTANCE DIALING REQUIRES A 2-5 CODE

The nationwide dialing plans for operator and direct distance dialing require that all stations be recognized by a 2-5 code. Few dial switchboards of earlier design have provisions for adding digit absorbing features economically. The Universal Digit Absorber fills this need easily and at nominal cost. Installation requires very little time.

The ever-increasing requirements of Extended Scope Dialing on a universal numbering arrangement are easily handled by the Universal Digit Absorber. The Digit Absorber is a factory assembled, fully-wired, applique unit that can be added to any existing dial switchboard to pad in three digits of exchange code (ABX) or four digits in the case of a small digit dial unit.

There are two types of Universal Digit Absorbers, depending on the complexity of the exchange codes assigned:

*19-S unit will handle exchange codes, as illustrated by AB-X, where the "X" digit is not a duplicate of the "A" or "B" digit.

*19-L unit is required where the "X" digit is a repeat of either the "A" or "B" digit.

In addition, Universal offers a Trunk Digit Register unit which can be applied to "Trunk on Line" dial units where five or more digits are required to be delivered to a 3 or a 4 digit tributary exchange.

*Pat. Pend.

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Mail this coupon to the nearest address.

Gentlemen: I am interested in your Universal *Digit Absorber* for 2-5 Numbering.

Name_____

Position_____

Firm_____

Address_____

City_____ State_____

T-1-25

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Customer satisfaction is one reason why L. M. Berry and Company has successfully enjoyed the association of leading Telephone Companies throughout the United States for 47 years.

Since 1919, L. M. Berry and Company has been handling the Directory Advertising for the La Crosse Telephone Company, an associated company of the Central Telephone Company . . . one of many of Berry's long-established satisfied customers.

You, too, can enjoy the many advantages and added profit derived from having L. M. Berry and Company handle your Directory Advertising. Call or write today.

CENTRAL TELEPHONE COMPANY
144 SOUTH 12TH STREET
LINCOLN 1, NEBRASKA

July 23, 1957

L. M. Berry and Company
Hulman Building
Dayton 2, Ohio

Gentlemen:

Recently I had occasion to review the operating results of the telephone directory work which your Company does for Central Telephone Company and its associated companies La Crosse Telephone Corporation, Middle States Telephone Company of Illinois, Virginia Telephone & Telegraph Company, Southern Telephone Company, and Southeastern Telephone Company.

As you well know your Company has had directory contracts with these companies for many years. The La Crosse contract dates back to 1919, Middle States 1928, Southeastern 1930, and Virginia and Central 1933.

The directory advertising, under your operations has grown to the point where in 1956 the total volume was in excess of $1,000,000. Our portion of this revenue, under the terms of your contract, is an important factor in our earnings.

What I really started out to say was that we are most pleased with your work and the fine treatment you have afforded us in the operation of the contracts. The truth is, with L. M. Berry and Company we write our own ticket.

I trust our fine relations will continue for a long time to come.

Very truly yours,

L. D. Densmore

L. D. DENSMORE
Vice President &
General Manager

LDD:mac

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AND COMPANY
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TELEPHONE DIRECTORY ADVERTISING EXCLUSIVELY

IN THE NATION'S CAPITAL

BY FRANCIS X. WELCH, WASHINGTON EDITOR

Secretary of Commerce Weeks now opposed to reimbursement of utilities for costs of relocating facilities in federal-aid highway projects. House Interstate and Foreign Commerce Committee and its sub-committee in disagreement as to how far the latter should go in investigating regulatory commissions.

SECRETARY of Commerce Weeks has dropped a bombshell in the camp of public utilities—all of them, both publicly and privately owned. He did this almost without warning earlier this month in the course of a report to the House subcommittee on public roads (released Jan. 8) in which he undertook to explain why the federal-aid highway construction program was going to cost so many more billions than originally estimated.

As a result, utilities are facing a hard fight to retain, in the federal highway program, even the present mild provision for reimbursement of the cost of relocating their facilities where state law permits. Under the 1956 act, states were given the right to decide for themselves whether or not to reimburse utilities for such costs from funds allocated to the states by the federal government. But Secretary Weeks called for *repeal* of this provision on the ground that too much federal money would be diverted from the main purpose of building roads.

Prior to 1956, Weeks noted, most states required utilities to bear the cost of relocating their facilities. Since then, however, some 16 states have authorized the use of federal highway funds to help defray relocation costs. "This drastic change in existing practice was not contemplated when the Federal Aid Highway Act of 1956 was enacted," Weeks said.

Changes in the law suggested by Weeks would apply equally to both public and private utilities. For this reason, an early and effective unification of effort on the part of all kinds of utility industries (that is, gas, electric, water, pipeline, railroad and transit, telephone and telegraph, and including the Rural Electrification Administration co-ops) and public agencies might prove strong enough to prevent repeal of the reimbursement provision. On the minus side of the picture is the policy of the administration to make savings wherever possible to offset the higher costs of national defense.

This whole apparent change, if not reversal, of administrative attitude can be laid to the pressure resulting from the "missile derby" and the tendency to cut down any non-defense spending which can be delegated elsewhere. If the legislation expected to be proposed is finally passed, it is fairly certain to be approved by the President. This adds up to a close and bitter battle at this session of Congress, which may well be ultimately determined by the side producing the best organized effort. Senator Case (R., S. D.) has indicated he will sponsor legislation to amend the reimbursement provision of the 1956 act.

State relocation laws are under attack in the courts in three states: Tennessee, New Mexico, and Montana. In the first two mentioned, the suits were brought by highway authorities for declaratory judgment as to the validity of the statutes, and both have already been argued, so that decisions should be forthcoming very soon. In Montana, a somewhat different approach was taken when a taxpayer sued the highway department for declaratory judgment. Issues are still being drawn in this case.

There have already been two court decisions on this subject, in Maine and New Hampshire, respectively, prior to actual consideration of bills by the legislatures. In Maine the court found some fault with the approach, which was rectified, and subsequently the bill was made law. In New Hampshire, the court found the proposed law perfectly all right, but thereafter the legislature failed to pass the bill.

Reasoning of Secretary Weeks

Secretary Weeks said that Congress should give consideration to repealing the relocation provision of the present federal law because the interstate system of highways runs into such a great amount of money for relocation to meet highway construction standards, which would permit speeds of 70 miles an hour in open country. Weeks said:

". . . The standards provide for control of access, complete elimination of railroad grade crossings and the elimination of virtually all other crossings and intersections, as well as other provisions deemed essential for the safe, efficient, and rapid movement of traffic. The installation of utility facilities within the rights-of-way of highways constructed to such standards, and particularly the utilization of the main traveled way of such highways as a service road for the installation, maintenance, and repair of utility facilities are inconsistent with the purposes for which such standards were adopted. We have given considerable thought to this problem recently, and feel strongly that a policy should be adopted which would preserve the safety features contemplated for the interstate system, and at the same time to make such necessary provisions for the utilities as are not inconsistent with this objective. We are now considering the preparation of draft legislation on this subject."

In connection with the general sub-

ject of utilities, Weeks told the congressional committee the same old argument about utilities occupying the highways. He said:

"I do not believe, however, that federal-aid funds should participate in the cost of relocating utility facilities where no vested property right is taken, and the utility is not entitled to compensation under constitutional provisions. A great many utility facilities occupy the right-of-way of public highways by permission of the states. Ordinarily, the utilities contributed nothing to the cost of acquiring the rights-of-way, paid nothing for the privilege of installing and maintaining their facilities thereon, and acquired no vested property interest in the rights-of-way. The occupancy of highway rights-of-way by public utilities is usually subject to the condition that the facilities not interfere with public travel, and prior to the enactment of the Federal-Aid Highway Act of 1956, the great majority of states required the utilities to bear the cost of relocating their facilities when such relocation was necessary to permit improvement of the highway."

Weeks conceded that where utility facilities had to be relocated from property belonging to such utilities, they should be justly compensated. That overlooks the obvious objection that the *money value of the real estate involved is often only a small part of the expense of relocating utility facilities.* In other words, if a telephone pole line or gas pipeline has to be relocated from a right-of-way owned by a telephone company or a gas company, Weeks thinks they should get some compensation for the switch-over. But, where the pole line or pipeline happens to run along a highway, he does not think compensation should be made. This may be an over-simplification of the argument. But it is clear that Secretary Weeks has been converted to the position of the highway construction bloc in Congress. That has been that every dollar appropriated should go for as much concrete highway as possible, letting other necessary expenses fall where they may.

Secretary Weeks gave the following résumé of legislative developments in this field since the federal law was passed:

"Since the enactment of the Federal-Aid Highway Act of 1956, which increased the federal share of the cost of constructing the interstate system to 90 per cent, and up to 95 per cent in public lands states, and expressly authorized the use of federal-aid funds for reimbursement of the cost of relocating utility facilities, a significant reaction has occurred in many state legislatures. During 1956 and 1957, legislation which would provide for payment by the state of the cost of relocating public utility facilities was considered by the legislative assemblies of 40 states. Such legislation was given

REA Approves $1,491,000 in Rural Telephone Loans

The Rural Electrification Administration approved telephone loans totaling $1,491,000 to four borrowers in Illinois, Kentucky, Tennessee, and Wisconsin during the weeks of Dec. 30 and Jan. 6.

South Central Rural Telephone Cooperative Corp., Glasgow, Ky., $433,000 (Jan. 6).

The borrower plans to furnish initial service for 322 farm families not included in previous loans. New facilities will include an automatic central office at Bonnieville and 127 miles of new line.

A portion of the loan will be used to complete construction of the previously authorized system. With its total of $3,233,000 in REA loans, the South Central Cooperative will be able to furnish new and improved service to 5,922 rural subscribers. Fourteen exchanges are now in operation serving approximately 3,900 subscribers.

Robert E. Eaton is president of the South Central Rural Telephone Cooperative Corp. Daniel B. Corman is manager.

•

Champaign County Telephone Co., Champaign, Ill., $295,000 (Jan. 8).

The loan will enable the borrower to acquire, rehabilitate, and integrate the facilities of the North Harwood Telephone Co. at Ludlow, complete construction of the authorized system, and improve headquarters facilities. North Harwood is now providing magneto service to 135 rural subscribers.

Loans to the borrower total $2,452,132, which will enable it to furnish new and improved service to 5,315 subscribers.

The completed system will consist of 16 exchanges. The Ivesdale, Milford, Ogden, Pesotum, Philo, Royal, Sadorus, Stockland, Tolono and Woodland exchanges are in operation and furnish automatic service to more than 3,100 subscribers.

James L. Capel is president and Max G. Hoagland is manager of the Champaign County Telephone Co.

•

Ardmore Telephone Co., Ardmore, Tenn., $275,000 (Jan. 8).

The borrower proposes to use the loan funds to furnish initial service to 405 rural families and improved service to 181 existing subscribers by extending its operating area into counties in Alabama.

The existing subscribers now receive magneto service from the Elkmont Telephone Co. at Elkmont, Ala. and the New Market Telephone Co. at New Market, Ala.

New automatic central offices are scheduled at Elkmont and New Market.

Loans to this borrower, now totaling $602,000, will make possible new and improved service to 1,528 rural subscribers in Tennessee and in Alabama. The completed system will also have an exchange at Ardmore, Tenn. in addition to the two provided for in this loan.

F. C. Merrell is president and manager of the Ardmore Telephone Co.

•

Shell Lake Telephone Co., Inc., Shell Lake, Wis., $488,000, first loan, to improve and expand telephone service in rural areas (Jan. 10).

The loan funds will enable this new borrower to finance improved service for its 751 rural subscribers and initial service for 200 farm families in the area. The Shell Lake company now provides magneto and common battery service.

The loan will finance the construction of new automatic central offices at Sarona and Shell Lake. According to the borrower's present schedule, subscribers will be able to call back and forth between the two exchanges without toll charge.

A. B. Quam is president and manager of the Shell Lake Telephone Co.

favorable consideration in 22 states, but was vetoed in 6 states, so that the legislation became law in 16 states. Under these 16 enactments, only one state will pay the cost of utility facilities on all state-maintained highways. Five of the enactments relate to all federal-aid projects and 10 relate to projects on the interstate system only, where the federal share of the cost is at least 90 per cent."

Weeks claims that this "drastic change" in existing practices was not contemplated when the act was enacted. But he had nothing to say on the subject at that time. His real point, which is contained in his report to the subcommittee, can be found in this concluding sentence on this subject: "If federal-aid funds continue to be available to reimburse the states for the cost of relocating utility facilities, federal expenditures for that purpose will increase substantially, with the result that correspondingly less will be available for the construction of highways."

In other words, if Uncle Sam can find a way to shove part of the highway expense over onto the shoulders of the nation's telephone subscribers and other utility customers, why not do it that way. And, that is what will happen, too, unless public utilities—all of them—get together mighty soon for a grand stand on this lastest development, so contrary to the interest of the utility consumer.

FCC Probe "Elevated"

The possibility of too many chickens coming home to roost may be the real explanation of why the House leadership suddenly decided to put the House sub-committee investigation of regulatory commissions on an elevated, broad, and general plane. Whether it will actually stay there is doubtful, considering the highly political character of some of the materials which go into this investigation.

But, in any event, this is what seems to have taken place last week when the so-called House Sub-committee on Legislative Oversight was told, in effect, to stop spending so much of its time on charges of petty chiseling and free loading by regulatory commissions, and to get on the ball with respect to some broad policy considerations for future legislation.

What happened was that the subcommittee, headed by Representative Moulder (D., Mo.), went before its parent group, which is the full House Interstate and Foreign Commerce Committee, headed by Representative Harris (D., Ark.). The sub-committee wanted the power to issue some subpoenas and members of the full committee wanted to know what for.

It developed that the sub-committee's staff had been given information that color television sets had been given or loaned by a certain large company interested in radio regulation to some members of the commission and staff. But, there was also the embarrassing rumor that some sets had likewise been given or loaned to some members of Congress.

How could the regulator be tarred without fouling the legislator? It looked like a case of a very small pot about to comment on the complexion of a very small kettle. A majority of the committee evidently decided that the whole thing was not that important.

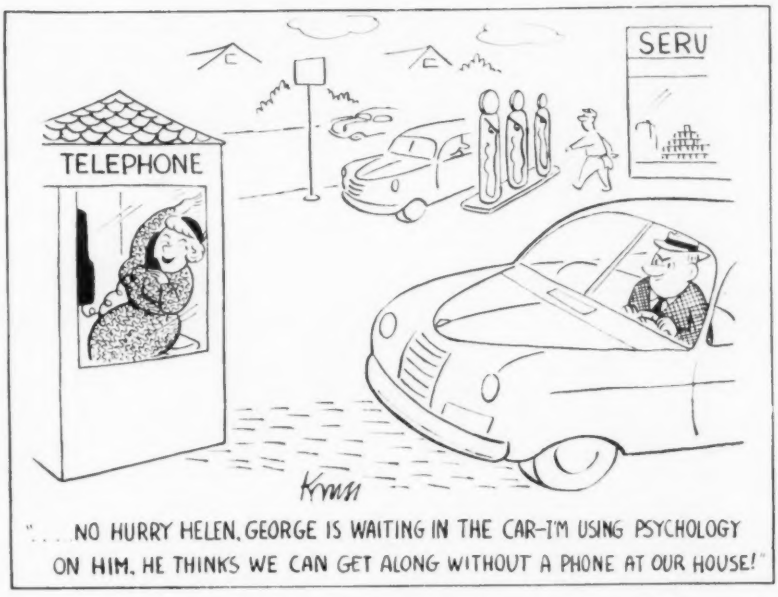
But, there were even bigger fish to fry. Some of the members of the committee had their knife out for some of the members of the Federal Power Commission (FPC) because they openly favored legislation which would have exempted natural gas producers from FPC regulation—or at least eased the burden of such controls. But, the chairman of the House Interstate and Foreign Commerce Committee was the author of the bill which would have brought about those results. Such a bill was passed by Congress in 1956 and reluctantly vetoed by President Eisenhower. Representative Harris thereupon sponsored another such bill, which is still before the House at this writing.

Furthermore, Speaker of the House, Rep. Sam Rayburn (D., Tex.), who was practically the moving spirit of this House sub-committee investigation, is also strongly interested in the passage of the Harris Bill. How, therefore, could the sub-committee turn on its own godfather?

And, so the full committee decided (6 to 2) to keep the sub-committee within bounds. This could be done by taking away from Sub-committee Chairman Moulder, the power to issue subpoenas. This power will now be exercised by the chairman of the full committee, Representative Harris. And he can be depended upon to see that no subpoenas will be issued merely for purposes of carrying out a "pin-pricking" investigation (to use Speaker Rayburn's expression). This development was not very pleasing to Subcommittee Chairman Moulder and another member of the sub-committee, Representative Moss (D., Cal.). Those were the two votes of the minority against limiting the operation of the sub-committee.

As the investigation is now set up, the first open hearings involving the FCC will begin on Jan. 27. It has now been agreed that the investigation will be "general" rather than a hit-or-miss attempt to expose alleged acts of misfeasance. The sub-committee voted to confine the investigation primarily to the issue of whether the agencies have been conducting their operations in a manner consistent with the intent of Congress in creating them.

Of course, there was released in public statements some soothing syrup about there being no disagreement at all about the investigation. But, for the present at least, the sub-committee is supposed to stick to general principles and let the peanut stuff alone. It is entirely possible, however, that before the sub-committee gets finished, enough dead cats will be thrown around to make some hot political arguments for use in the campaign next fall. The temptations in that direction, at this time, seem almost too great for the politicians to resist.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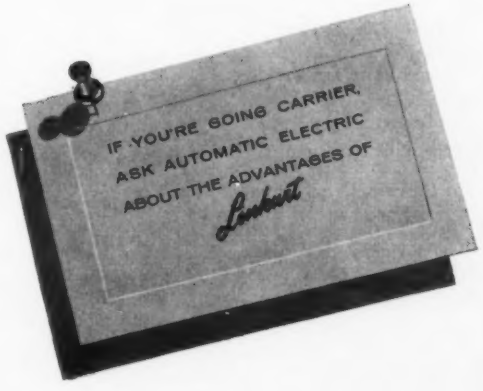

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White Alice station at Tatalina, part of Alaskan military and civilian network.

Engineering The White Alice Network

By R. B. STECKER*

WHITE ALICE, largest beyond-horizon communications system in existence, has 3,000 route miles of telephone and telegraph circuits covering the territory of Alaska. Although 25 per cent of the equipment is of standard Bell System type, the remainder had to be selected or designed to meet performance requirements and the area's extreme environmental conditions. Selecting antenna sites, transmission computations, antenna construction and dual diversity action of the Forward Propagation Tropospheric Scatter technique are described.

Introduction

White Alice is a communications network engineered to serve the integrated military and civilian communications requirements over much of the Territory of Alaska. It is the largest Forward Propagation Tropospheric Scatter system in existence. The name "White Alice" has no particular meaning, and was selected because it was the next code name available at the time the project was authorized by the U. S. Air Force.

Under the White Alice contract, the Western Electric Co. is furnishing to the Air Force an immense long distance communication system in Alaska, complete and operational. This system will play a vital part in the air defense of North America by providing reliable communications between the many Alaskan radar outposts and other military installations. Telephone and telegraph circuits are being furnished for the use of the Army, Navy and other government agencies such as the Civil Aeronautics Administration. Public use of the telephone and telegraph circuits will be available through the agency of the Alaska Communications System operated by the Signal Corps.

Radio Relay Equipment

The rugged terrain and severe weather conditions encountered in much of Alaska make the construction and maintenance of conventional long distance cables or open wire telephone lines almost impossible. Radio transmission techniques, therefore, are being used for all White Alice routes.

Limited Microwave Use

A total of eight links of microwave radio relay of the type used in transcontinental service by the Bell System have been used. This type of radio transmission, however, requires many stations, closely spaced, because each station must have an unobstructed line-of-sight path to the next one. For this

*Mr. Stecker is with Western Electric Co.

reason, use of microwave radio relay in Alaska is limited to built-up areas where the repeater stations can be situated near all-weather roads for maintenance in any season.

Beyond-Horizon Predominate

The large majority of White Alice routes have been provided by means of 23 Forward Propagation Tropospheric Scatter links. These links are capable of spanning distances up to 200 miles or more, making construction and maintenance more feasible in the Arctic wilderness than the conventional closely spaced repeater stations.

Early in 1955, when White Alice was started, beyond-horizon radio was in an early stage of development with many unsolved problems. It appeared so admirably suited for the communication requirements in Alaska, however, that despite the uncertainties its use was considered justified.

Extent, Facilities Network

Fig. 1 is a map of Alaska showing the various routes that make up the White Alice network. Connections are made with the DEW line and through-connections back to the United States can be made at either Anchorage or Fairbanks.

Alaska is a vast territory and distances between circuit terminal points are long. For example, the airline distance from Anchorage, located in the southeastern section of Alaska, called the "Banana Belt," to Kotzebue on the western seacoast is over 700 miles. To adequately cover Alaska's large area, communication facilities in the White Alice network total 3,000 route miles.

Each route carries many channels, amounting to about 170,000 telephone channel miles and about 50,000 telegraph channel miles.

Selection of Equipment

White Alice was engineered to have the same reliability and over-all circuit performance as Bell System long distance circuits in this country. These high standards were not easy to achieve with the extreme environmental conditions encountered and a network composed entirely of radio transmission facilities. Utmost care was required in the selection of equipment units and their integration into the completed system.

Commercially available equipment was used wherever possible. About 25 per cent was of the standard Bell System type, manufactured by Western Electric Co. This included Type TD-2 microwave, Types K and L broadband carrier terminals and Type 43A frequency-shift telegraph equipment. The remaining 75 per cent of the equipment included such items as diesel generators, beyond-horizon radio equipment, antennas, transmission lines, etc., obtained from over 800 different suppliers.

TYPICAL BEYOND-HORIZON LEVEL DIAGRAM

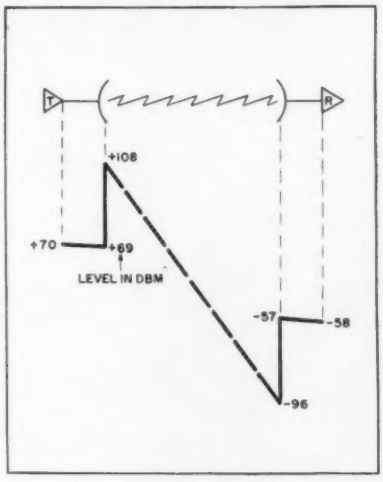

Fig. 2

In some cases, particularly in the area of beyond-horizon radio, suitable commercial items were not available and design work was needed to meet performance requirements consistent with the objectives of the entire system.

Objective Performance Requirements

It was expected, however, that the over-all system performance, while affected by equipment design, was more likely to be controlled or limited by the characteristics of beyond-horizon radio propagation. Only a small amount of information was available concerning these characteristics. Some experimental work had been done by Bell Telephone Laboratories, Lincoln Laboratory, and others, and the first multilink beyond-horizon installation had just been placed in service in Newfoundland. With assistance from the Bell laboratories, engineering criteria were established and procedures were formulated for selecting site locations and for determining the propagation characteristics of each White Alice beyond-horizon path.

Noise and Reliability. Two of the most important measures of the quality of any radio system are noise and reliability. In engineering the White Alice network, the Bell System long-haul noise objective of 38 dba, meas-

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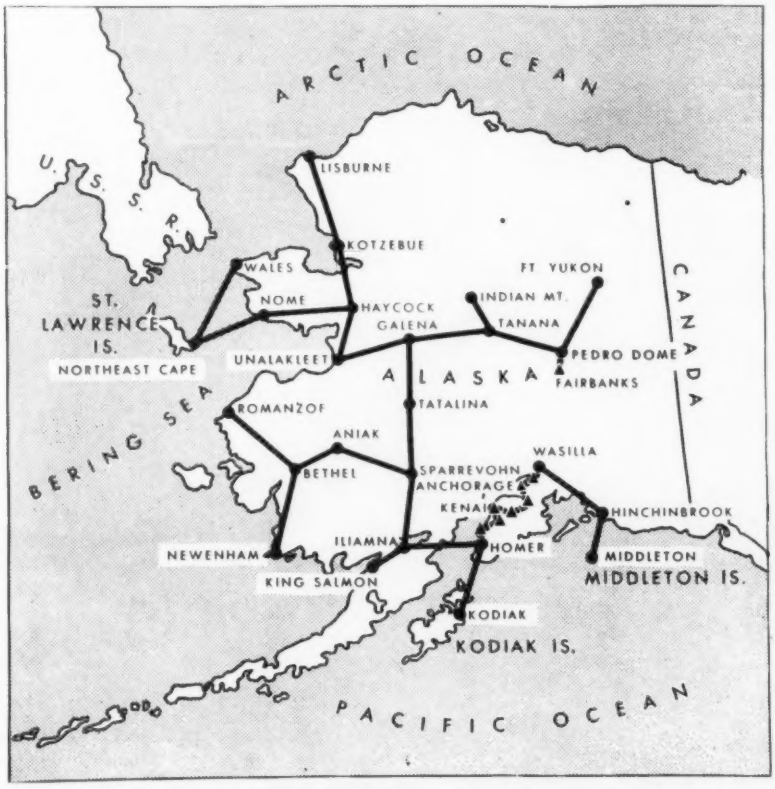
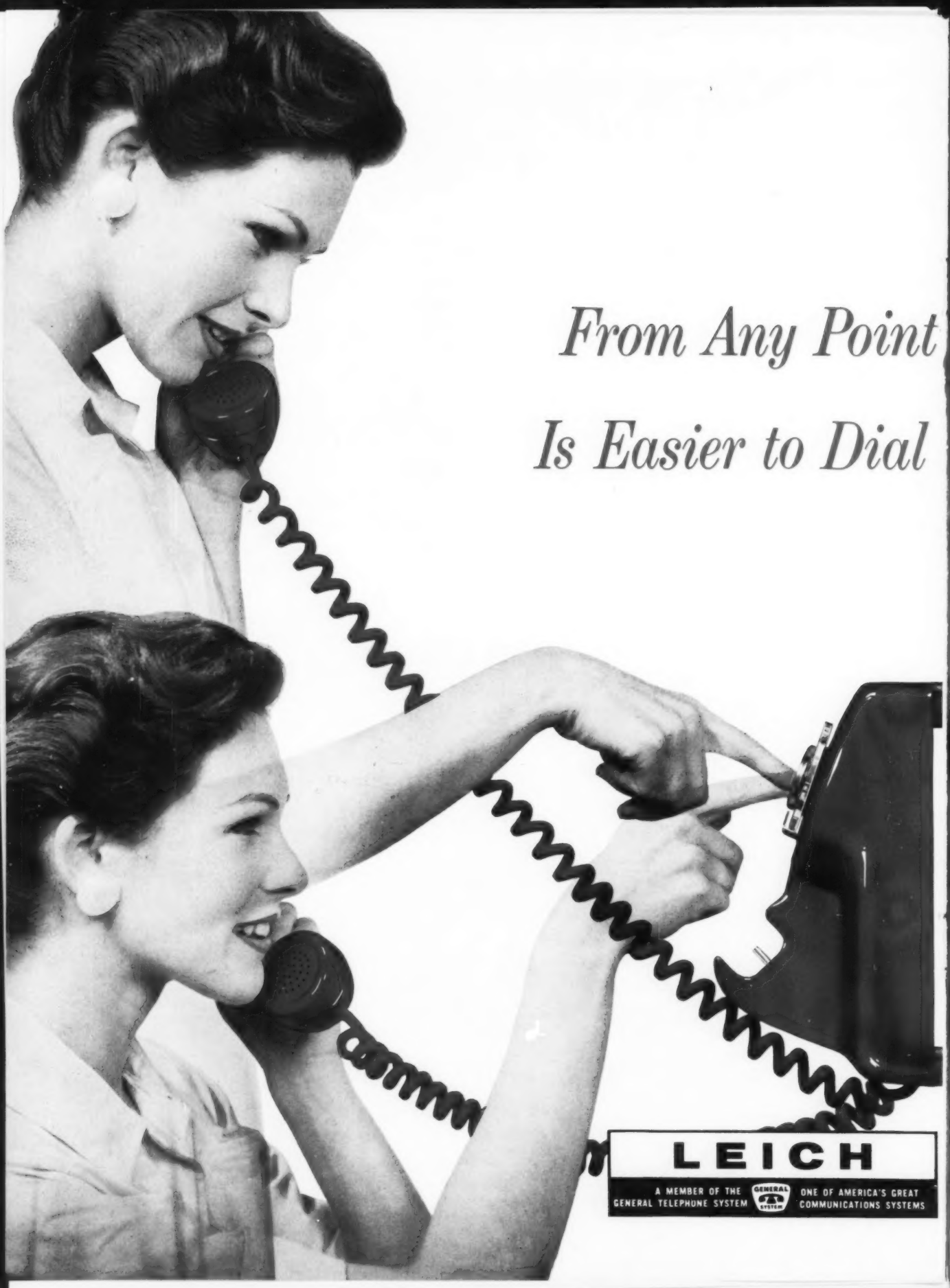


Fig. 1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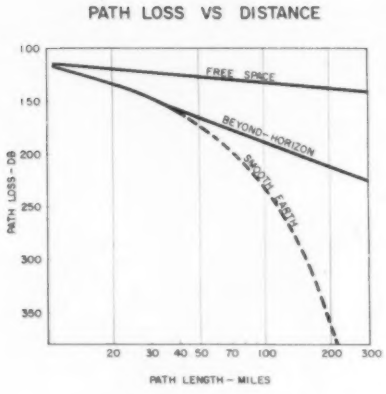


Fig. 3

ured at the zero transmission level point, was used. An objective of 99 per cent reliability during the worst month was also used.

Bandwidth and Signal Levels. The average number of telephone channels carried by the routes in the network is about 60 channels. Some of the heavily-used routes carry over 100 channels. To care for all requirements, and also to permit reasonable future growth, it was decided to design the beyond-horizon portions of the network to have a maximum capacity of 132 channels. This, of course, largely determined bandwidth requirements. Bandwidth, together with other equipment characteristics such as deviation ratio and carrier loading, determined an acceptable lower limit for the received signal level consistent with the noise and reliability objectives.

Transmission Levels. Fig. 2 shows a level diagram for a typical beyond-horizon radio link. On this chart the various factors such as transmitter output power, antenna gains and path loss are combined to produce a signal level at the receiver input. In order to be able to span the greatest possible distances, powerful transmitters and very large antennas must be used.

The most powerful transmitters available for the White Alice project were capable of an output of 10 KW in the range of 700 to 1,000 megacycles. This equated to the transmitter output level of +70 dbm shown on the chart. Similarly, 60 foot diameter antennas were the largest considered feasible for White Alice. These antennas have a nominal gain of 39 db and this gain has been shown for both transmitting and receiving antennas on the chart. Transmission line loss between the transmitter and receiver and their respective antennas has been included at a nominal figure of 1 db.

The received signal level of —58 dbm, shown on the chart, is the objective minimum received signal level used in engineering White Alice. As will be shown later, beyond-horizon propagation does not lend itself to discreet numbers but is fluctuating rapidly all of the time. The —58 dbm objective is, therefore, a statistical type number representing a long-term, median value.

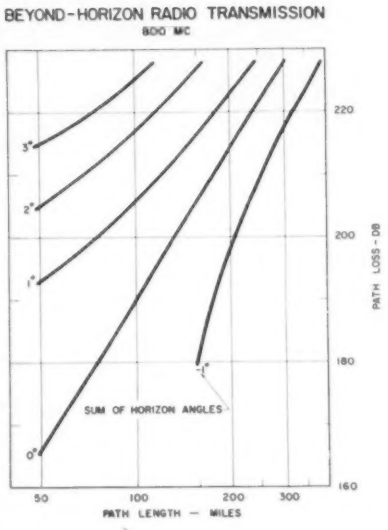
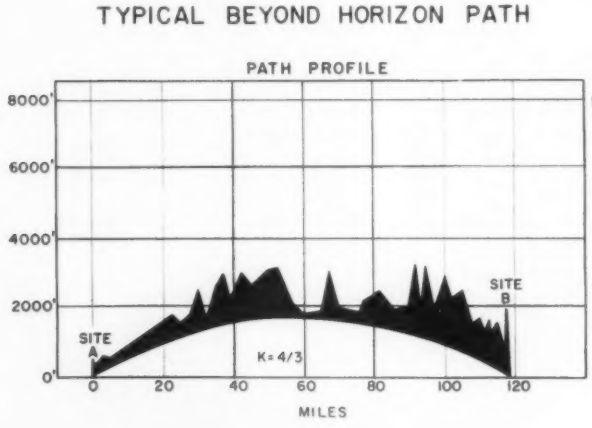


Fig. 4

The chart of *Fig. 2* shows that with the largest available transmitters and antennas the maximum allowable path loss to give performance measuring up to objectives is about 204 db. This, of course, is also a statistical median quantity.



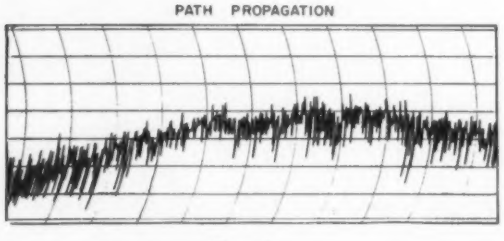
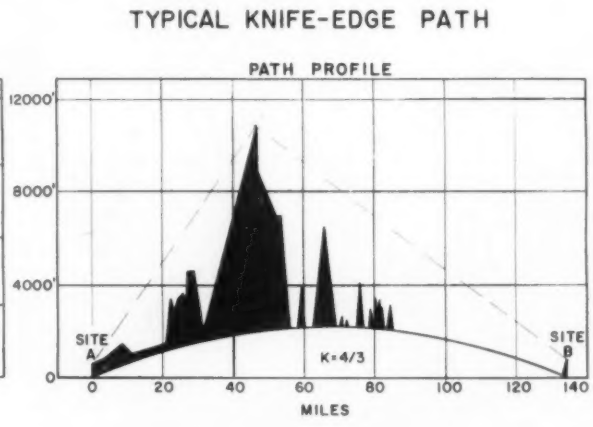


Fig. 5



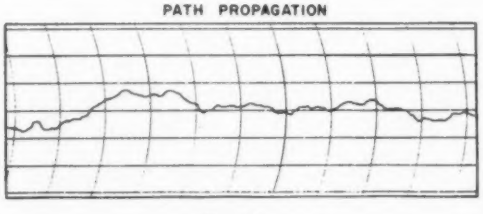


Fig. 6

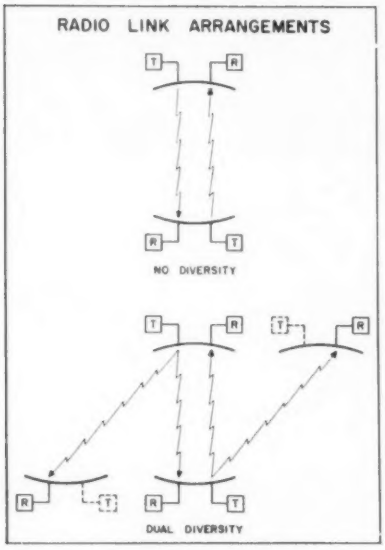


Fig. 7

Forward Propagation Tropospheric Scatter

For some years now, radio engineers have been used to working with line-of-sight radio systems. Repeater spacings for this type system are in the order of 20 to 30 miles, or possibly up to even 50 or 60 miles in terrain, where sites can be located on high mountain peaks. The path loss of such links is in the order of 120 to 130 db. However, until very recently it was believed that radio signals faded out rapidly beyond the horizon and that even with allowable losses of about 200 db, path lengths would be limited to well under 100 miles.

Evidence that this signal attenuation with distance was not being encountered in practice became apparent during the second World War. Cases were noted where radar equipments picked up targets at distances theoretically well beyond their maximum range. In the years following the war, more evidence piled up. The TV "freeze" in the late 1940's was brought about, at least in part, by this phenomenon.

In the same period, the Bell System was constructing multi-link microwave systems for the transmission of telephone and television channels throughout the country. Here, too, there was concern with "over-reach" of a signal from one transmitter into receivers several links down the line and theoretically well out of range.

Up to this point, beyond-horizon transmission was merely a nuisance. Signals which should have disappeared continued to exist at high enough levels to cause interference. A number of studies of this unusual propagation phenomenon were made. In 1950, K. Bullington of the Bell laboratories summarized information showing that beyond-horizon transmission was possible to a far greater extent than had been predicted earlier and suggested that this type propagation be put to practical use in areas where terrain or other conditions made long spacings between repeaters imperative.

Path Loss vs. Distance. As shown in *Fig. 3*, free space transmission in the area of practical line-of-sight distances is in the range of about 120 to 130 db. The path loss at greater distances as predicted by the smooth earth theory, increases very rapidly with path length, reaching a value in excess of 350 db at 200 miles. The curve labeled "Beyond-Horizon" on the chart represents propagation data first prepared by Mr. Bullington and now verified by many other measurements of beyond-horizon paths over the past few years. This curve shows that practical path lengths in the order of 100 to 200 miles may be obtained with path losses in the order of 200 db.

Antenna Angle of Elevation. In addition to variations in path loss with distance, it has been found that the angle of elevation from the antenna to the horizon has a significant effect on beyond-horizon path loss. *Fig. 4* shows a family of curves relating path loss with distance for various angles. In each case the sum of the two horizon angles at each end of the path is the value shown on the curve.

For example, a path 100 miles long having a horizon angle of ½° at each end would have a total horizon angle of 1° and from the 1° curve would have a loss of about 206 db. It can readily be seen that large horizon angles seriously limit the length of useful beyond-horizon paths.

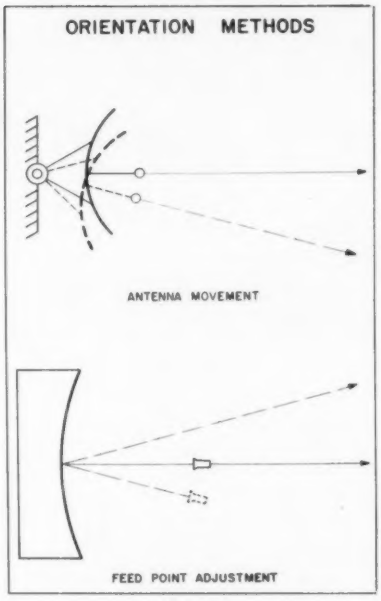


Fig. 8

Conversely, if elevated sites can be obtained, small negative horizon angles are possible and these will permit somewhat longer paths to be used than would otherwise be possible.

In practice, on the White Alice project, the sum of the horizon angles for any given path seldom exceeded ½°, positive or negative. Again, as previously noted, beyond-horizon transmission is a continuously varying quantity and the curves of *Fig. 4* depict long-term median values.

Selecting Sites-Path Loss Computation

Fig. 5 shows a profile of a typical beyond-horizon radio path. The vertical

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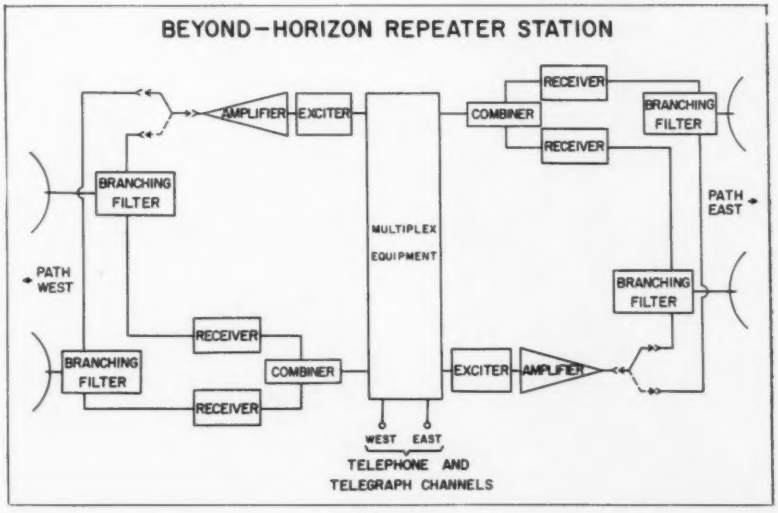


Fig. 9

THE Operator's Corner

By MAYME WORKMAN — TRAFFIC EDITOR

TELEPHONY, along with other lines of business, is becoming more complex. The operation of a switchboard and the handling of telephone calls requires skill and know-how. Therefore, people employed to perform this service must have the necessary qualifications to do the job satisfactorily.

Having a broad interest is helpful. This means many things, but probably the two most important are showing a keen interest in human problems and in other phases of the company's operations, in addition to performing your own specific tasks.

To succeed in any job, an individual must be willing to accept responsibility, make decisions, and, occasionally, take chances. People who don't take risks and make sacrifices seldom become leaders.

Do you really like people? Human relations have taken on a new value and new importance. To get along in business today, we must also be able to get along with people. The easiest way, of course, is to like them genuinely. This means looking not for faults, but for good qualities in the people you work with. The habit of liking people can be acquired if you work at it. Without it, your path in the business world is difficult.

Are you continuing to learn? Most people in a supervisory capacity are dissatisfied with their own work and are continually striving to improve it. Whenever an individual reaches the point where he thinks he knows it all, he's in trouble. Education must be a broad and continuous process. It must include a willingness to consider advice. This is particularly true in the telephone industry, especially in the traffic department where operating methods and procedures are constantly being revised and new methods are being introduced to improve telephone service rendered to customers.

A person in an executive or supervisory capacity must be well organized. They must not only have the ability to organize their own time and work, but also that of other persons.

Probably the most important by-product of highly organized thinking is the parallel ability to delegate responsibility freely and decisively, and to get things done through other people—by inviting suggestions and encouraging participation.

Have you the courage to speak your mind when you feel you are right without becoming antagonistic? Conversely, are you willing to admit being wrong when evidence so indicates?

Knowing what your responsibility consists of is important, too. For example, a chief operator's time is too valuable to devote it to doing detail clerical work, except perhaps in a very small office. If you are doubtful as to what your responsibility consists of, take the necessary time and make the effort to find out.

A friend of mine, formerly a chief operator in a small town, now working for an insurance company, called to tell me she had just taken a job analysis test. There were various questions to be answered in this written test, and the participant graded herself in accordance with her idea of her ability on each item. She did not know her company had made an analysis of her work, using the same form. When she turned in her signed form she learned, much to her surprise, that on practically every item, her company had given her a higher rating. Her immediate supervisor also told her the increases she could obtain, salary wise, and the maximum rate for the work she is performing. Needless to say, my friend was happy in the knowledge she is doing a satisfactory job for her company and that she has a bright future in store for her, dependent upon her continued interest and job production.

It is always good to know if we are doing a satisfactory job and, if not, what we can do to improve our work. Regardless of modern thinking on the part of some individuals, I still believe success in any field is largely due to individual effort, interest in job performance, initiative, study, courage in making decisions, technical knowledge, and the ability to get along with people, plus good health.

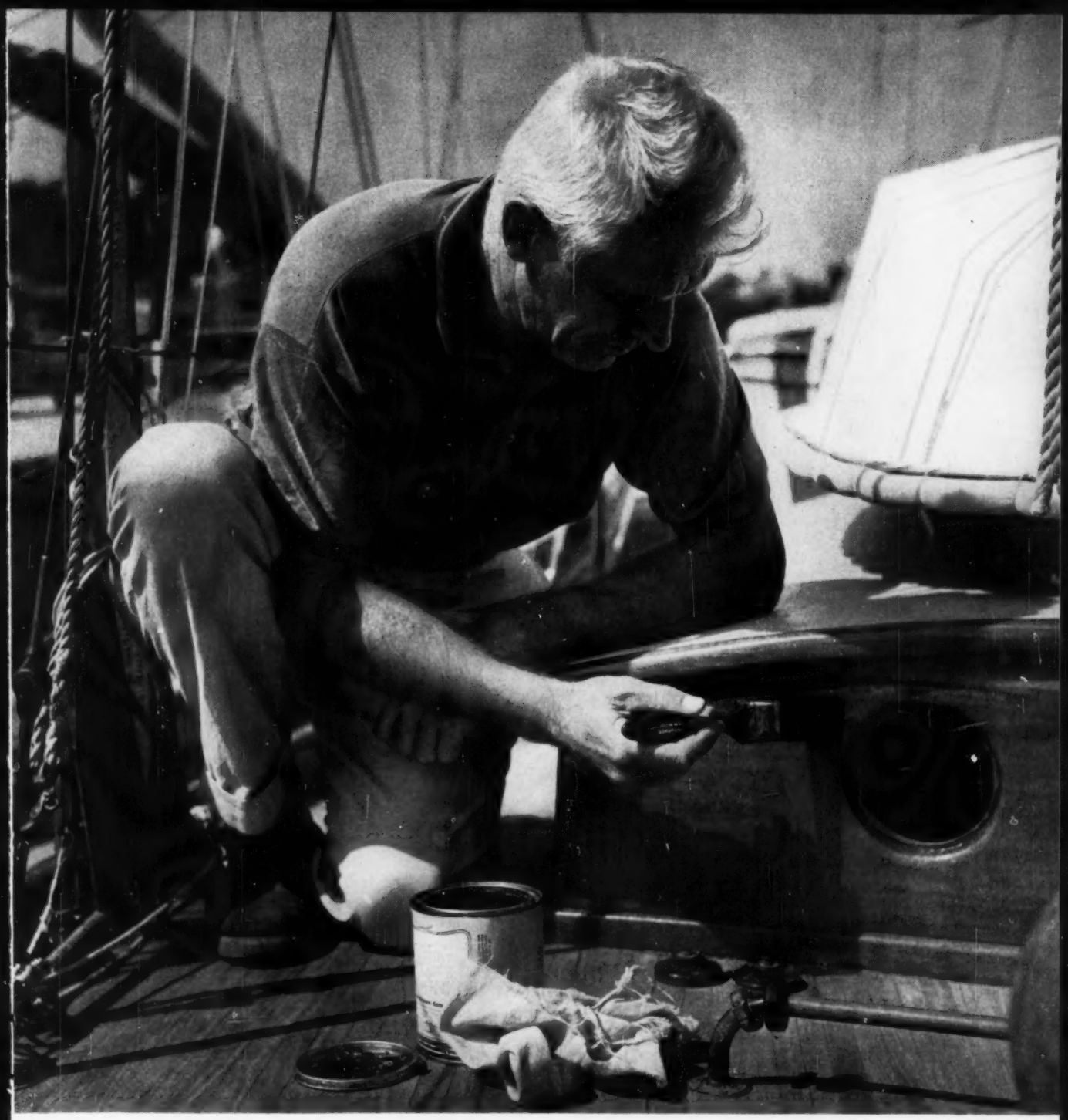
This is the season of the year when we should take stock of ourselves. What have we accomplished during the past year? Have we realized any of our ambitions. If not, are we to blame?

From a health standpoint, have we taken the necessary precautions to be physically fit to enjoy life and to perform our work satisfactorily? It has been said, the Chinese pay a doctor to keep them well. A sort of "preventive maintenance" with which telephone folk are familiar. Illness is expensive, it often causes a great deal of suffering and inconvenience. An annual check-up, particularly after age 40, often prevents chronic illness and much suffering and, in some instances, prolongs life. From a health standpoint, an annual check-up is a valuable investment. After undergoing a series of check-ups and tests, it is a glorious feeling to have your doctor say, "I can give you a perfect bill of health." Being an annual "checker-upper," I know!

Obtaining the proper amount of rest is important in keeping physically fit. You can burn the candle at both ends occasionally, but if you do so persistently, you are bound to have a repercussion.

If you have chosen the right vocation, work is a pleasure when you are physically fit, but it is drudgery when you are not feeling up to par. Perhaps it would be a good New Year's resolution for each individual to give as much attention to their physical fitness as they do to their automobile. You know what happens to it when it is neglected—it shortens its life and usefulness. "Nuff said!"

(Please turn to page 62)



TIME IS THE MEASURE OF ALL WOOD PRESERVATION

During working hours or leisure hours—if the topic is wood preservation, the question is, "Which method?"... For more than fifty years, major industrial users of wood have confirmed that the best answer is AMCRECO pressure treatment.

AMCRECO
PRESSURE TREATED
WOOD PRODUCTS

AMERICAN CREOSOTING CORPORATION LOUISVILLE 2, KENTUCKY
SUBSIDIARY OF UNION BAG-CAMP PAPER CORPORATION

Fun bubbles both
ways in a friendly
"telephone break."

There's fun in telephoning!

When people consider the value of their telephone service, they naturally think of it in connection with emergencies—how it gets them to the police, the fire department or their doctor faster than anything else.

But they don't always give the telephone credit for the fun and pleasure it brings into their lives. When people call a neighbor just for a chat, they're getting value, too.

This month in many national magazines there will be a Bell System advertisement in full color with the headline, "It's fun to phone." By talking about the sunnier side of the telephone's value, and by stimulating local usage across the country, this ad should serve the interests of all of America's telephone companies.

BELL TELEPHONE SYSTEM

THE Plant Man's Notebook

BY RAY BLAIN, TECHNICAL EDITORIAL DIRECTOR

OUT IN California, The Pacific Telephone & Telegraph Co. is conducting an extensive campaign designed to reduce the wrong number calls dialed by customers. In Fresno, for example, out of an approximate 800,000 locally dialed calls a day, 5 per cent were found to be improperly dialed. Now, at last count, the incorrectly dialed calls are down to under 3 per cent, a reduction of over 16,000 calls per day. In Bakersfield, the current percentage of misdialed calls is 3.1, as compared to a previous 4 per cent in July.

A specially trained team of instructors has been working on this program since last September. Media used were: Supermarket dialing demonstrations, calls and personal visits to customers' homes, newspaper ads, radio spot announcements, TV 20-second spot announcements, bill inserts, telephone number display letters, and leaflets to business customers. In some cases, also, use was made of bill inserts reminding subscribers to "look up the number, write it down, dial carefully."

The number of misdialed calls, it is stated, increased along with the provision of more complex services, designed to meet the needs of California's rapid growth. For example, as the number of digits to be dialed increased, the possibility of error in dialing also increased. Many customers who formerly dialed four, five or seven digits to call their local friends, now dial as many as 13 digits on some of their nationwide calls.

•

A new nylon resin, combining mechanical toughness with outstanding resistance to heat and weathering, has been developed by du Pont. Named Zytel 37X nylon resin, it is designed primarily as a wire-jacketing material.

Wide use is foreseen in jackets for power and communications cables, wire rope, service drop wire, and tree wire. Maintenance work caused by tree growth can be greatly reduced when line wire has a thin protective jacket of this material.

A black moulding and extrusion powder, Zytel 37X is specially compounded with heat and light stabilizers. Although du Pont is not yet ready to predict ultimate outdoor life, accelerated heat and light tests indicate that this material will outlive any other nylon.

•

A new and novel idea is to print any slogan, emblem, name or insignia, across the cuffs or backs of industrial gloves now available. This can be used as a constant safety reminder, or a boost of quality.

It can also be used to reduce pilferage and to improve housekeeping. Printing service is offered free to purchasers of gloves.

These gloves are available in canton flannel, double palm, hot mill, reversible, jersey, nylon blend, leather palm, drivers and other types.

•

We had an opportunity recently of inspecting a new prefabricated galvanized metal building that had been constructed to house a communication facility, and were agreeably surprised.

This building was well insulated, air conditioned, and heated by electricity. The concrete floor was covered with asphalt tile. The ceiling made use of acoustic tile and fluorescent lighting did a good job.

We did not learn how the cost of the prefabricated building compared to a permanent type masonry building, but certainly its constructing time would be considerably less.

It would appear that this type of building should prove ideal for housing satellite telephone exchanges, microwave repeater stations, etc.

•

Through-dialing was introduced on 12 switchboards involving 40 government agencies in the Washington, D. C. metropolitan area recently. This faster telephone service enables any extension user to dial direct to any of the 97,000 government agencies' telephones.

Previously, in order to make a telephone call from one agency to another, it was necessary to dial a code to reach the distant PBX operator who then would connect the desired extension manually. Now, when the extension number is dialed after the code, the connection is made almost immediately.

Advantages of this through-dialing feature were evident as early as 1956 when the advance planning was started. A traffic study made at that time indicated that approximately one-third of the incoming traffic, at the average government PBX, were calls from another agency. It was also determined that almost 90 per cent of these callers knew the extension number they were calling.

•

An effort is being made in Telephone, Texas, to get the town back on a telephone line. It is reported that a representative of a cooperative recently surveyed the area and promised to connect the town of Telephone up to a line if it could obtain a sufficient number of subscribers in the community.

Pollock Series Delayed

The publication of the articles entitled "Design and Operation of Small Companies" has been interrupted because of the illness of the author, R. J. Pollock. We understand that the "flu bug" is on the run and Mr. Pollock will be able to resume preparation of his popular articles soon.

Here's a telephone battery that:

lasts at least 40% longer!

requires 80% less current and water!

delivers high output all its life!

C & D's PlastiCal is the most outstanding floating-service battery of the last 50 years. Here's a basically new battery that combines a durable, clear-plastic case with lead-calcium* grids. This new alloy of pure lead and calcium gives grids the strength of those with a large antimony content, but eliminates the harmful effects of antimony.

**A development of Bell Telephone Laboratories*

C & D's PlastiCal has these advantages:

1. ***a 40% longer life*** than any lead-antimonial battery in floating-service. There is no antimony in the PlastiCal to poison negative plates.
2. ***requires 80% less current*** to maintain itself in a fully charged condition. Lower charging rate means plates last longer.
3. ***requires 80% less water.*** Because PlastiCal uses less current, there is less electrolysis of water.
4. ***low maintenance cost.*** PlastiCal can be checked at a glance because the electrolyte level is always visible.
5. ***delivers high output throughout its life.*** Rated capacity remains steady because negative plates do not become contaminated.

C&D

BATTERIES, INC.

of Conshohocken, Pa.

(In the Philadelphia area)

FREE!

For complete information and specifications on PlastiCal—the century's greatest battery development—write for folder T-528.

SALES AND SERVICE OFFICES IN PRINCIPAL CITIES FROM COAST TO COAST

The local telephone system was put out of business by sleet storms back in 1949 and has never been rebuilt.

•

Several years ago we had the privilege of visiting the Western Electric's Indianapolis Works, the largest telephone set manufacturing plant in the world, with Chet Budd, of the New York office of the Western Electric Co.

The buildings of this plant cover nearly 20 acres and, according to a recent report, now turn out over 27,000 telephone sets a day for the Bell telephone companies. Inside this modern plant, skilled men and women, using the most advanced methods and techniques, create telephones that range from the "500" sets in glamorous colors, all the way to explosion-proof sets.

The birth of a telephone requires less than one hour of human effort. Yet, many operations are required before the set is finally placed in its box and ready for shipment.

This plant is the finest example of automation that we have ever seen. The conveyor system is amazing. Not only do these conveyors bring in new materials and remove the finished product but they are also used effectively on the assembly line. The absence of hand trucks moving materials certainly removes much of the clutter from the aisles.

A machine used to test networks automatically, proves most fascinating. For example, if a certain condenser is found to be defective, the unit is routed to a certain bin, a bad resistor into another.

Perhaps, some day, we shall have similar factories turning out guided missiles. And when that time arrives, we will cease to worry about Sputnik.

•

John and Martha Cushing, who own and operate the telephone system at Sitka and Kodiak, Alaska, have a fine cabin cruiser named "Teleco II." This boat is pictured in a most attractive manner on their 1957 Christmas card.

•

The *Indiana Telephone News* reports that a Missouri farmer noticed that his corn grew greenest in his fields across the path of an underground cable where the subsoil had been brought to the surface.

He experimented with plowing up the subsoil on a 15-acre plot and found that his profits jumped $512.50, and his yield per acre 27 per cent. It is reported that county farm groups will experiment further.

Plant Man's QUIZ

By RAY BLAIN, Technical Editorial Director

Q. We have heard of a new method of attaching cable to a messenger strand without the use of a lasher. Can you describe this method?

A. To use this method, the lashing wire is coiled up like a spring and the messenger strand run through the center. Then, as the cable is pulled in, this action uncoils the spring and forms it around the cable.

The lashing wire springs are made in 21-inch lengths for 300-foot spans and can be cut to length on the job. A 7-inch length will lash a 100-foot span.

•

Q. Can you give us any information on a special telephone that we understand has been designed for use in noisy locations?

A. We assume that you have reference to the Gai-Phone which is a telephone subset designed expressly for use in high-noise-level areas. This instrument, it is claimed, eliminates the need for noise-proof booths or other acoustic protection.

Sidetones can be varied with this telephone from normal to below audibility. In areas of high noise level, the noise picked up on the transmitter and fed to the receiver can be eliminated or reduced to a comfortable level. This action permits the user to hear clearly the voice signal coming into that area. A concealed control adjusts side-tone level at the time of installation.

This special telephone provides control of incoming (receiver) volume level and outgoing (transmitter) level. This feature permits its use as a terminal repeater station on relatively long lines.

•

Q. Will you please inform us where we may obtain reliable and accurate information on closed circuit television systems?

A. It is suggested that you obtain a copy of the new book, "Closed Circuit TV System Planning," by Mayers and Chipp. This book may be purchased through TELEPHONY.

This 264-page cloth-bound book is well worth the price of $10 to anyone requiring information on closed circuit television systems. This is the most complete and authoritative advisory source for all who are contemplating the use of closed circuit television.

It is an excellent guide for those who are faced with the responsibility of planning and evaluating closer circuit TV systems, and it answers all questions related to the organization of closed circuit television systems such as space requirements, cost of equipment and its installation, types of equipment available and manpower necessary to operate and maintain the equipment.

•

Q. Please tell us what is considered the best and most economical method of providing underground service entrances to the average modern dwelling.

A. Perhaps the best method is to provide a conduit so that wire can be pulled in and out as required. If conduit is used, it should be drained into either a sump or sanitary sewer.

There is no doubt that the installation of buried wire or cable is more economical and this type of construction is being extensively used at the present time.

If buried wire is used, at least two pairs should be provided—one pair in use, and one spare. This will provide a pair for use in the event of trouble or it will be available if a second line is required in the residence at some future period.

•

Q. Can you furnish us with a satisfactory method of splicing parallel drop wire in the field? We have a method in mind that uses compression-type sleeves on the conductors and a covering of vulcanized plastic or rubber.

A. A method of this type is used in the shop by some of the larger companies, but we seriously doubt that it would prove satisfactory for field use.

In most cases, the labor cost of splicing short lengths of parallel drop wire in the field exceeds its worth.

today's

Highlights

of finance-taxes-business trends

by Willard F. Stanley

STOCK MARKET OPENS NEW YEAR ON CHEERFUL NOTE: After closing 1957 substantially down from the 1956 year-end (about 20 per cent) according to New York Times 50 combined stock average, stocks perked up with the usual New Year rally and at Jan. 15 this average stood 4 per cent above the 1957 year-end and nearly 6 per cent above a month ago (Dec. 18).

This rise seems largely traditional and correctional after the severe decline in December. Consensus of informed sources still see a falling off of business and profits in early 1958, with improvement in the latter portion for the year. One usually reliable predicting organization looks for increased earnings in a majority of 65 selected industrial companies. This source foretells an increase in earnings by each of 25 utilities selected, with dividend increases anticipated for about two-thirds of this number. But earnings and dividends of most railroads are almost unanimously expected to decline in 1958.

Presently, everything points to utility common stocks as the outstanding protective investment medium for the near future, with expectations of modest earnings increase and also higher dividends, in many cases. No doubt there will prove to be many industrial equities showing near term price appreciation, but these investments need a good deal of selective judgment—and a bit of luck is always helpful, too. Missile stocks, the best recent performers, may have shot their bolt temporarily. Growth stocks generally have given a poor account of themselves in recent months.

* * * *

BOND MARKETS STILL STRONG AFTER TURN OF YEAR: Despite the phenomenal rise in bond prices (and consequently fall in bond yields) which began in November and moved forward at a faster pace during December, the New Year finds bond prices still climbing, although at a reduced rate. Jan. 10 offering of Connecticut Light & Power triple "A" rated bonds on a 3.89 per cent yield basis represented the lowest interest yield seen for a long time in this type of security—nearly 1 per cent per annum below the yields on similar new issues offered at the peak interest rates of last Fall. The same is proportionately true of the shortly previous offering of Columbus & Southern Ohio Electric bonds on a 4.07 per cent yield basis.

In the short-term category, treasury bills have been currently paying only about

Mr. Stanley, formerly financial vice president of Southwestern Public Service Co., an electric utility with over 160 million dollars in assets, is president of Corporate Services, Inc. of New York City. He is a member of Controllers Institute of America and New York Society of Security Analysts. He serves on three committees of the Controllers Institute having to do with federal taxation, social security and finance management. His articles are appearing once a month in TELEPHONY.

2.75 per cent per annum—nearly 1 per cent per annum down from a few months back. And, at Jan. 10, yields on long-term U.S. government bonds were at a low for 1957-1958.

Wall Street Journal tabulation of 16 new issues of utility bonds shows average yield on bid prices at Jan. 10 were 25 decimals (0.25 per cent per annum) lower than average yield based on original offering prices of these new issues. While this showing appears less favorable than the 28 decimal lower average yield registered by this source on the same basis at about Dec. 15th, the recent performance is actually better when considered realistically, because the new tabulation includes a number of recent issues offered at drastically lower interest rates, thus making marked improvement in prices more outstanding when the short time since these issues were sold is taken into account.

Predictions of many informed sources appear favorable for issuers with respect to interest rates on new funded debt offerings during 1958. We are inclined to join in the belief that lessening of expansion expenditures should result in some further reduction in yields on new funded debt issues of utilities during the current year.

Despite this prospect of further improvement, we repeat the gist of last month's analysis, i.e., that after such a drastic and rapid decline in long-term money costs, every effort should be made to participate in the current relatively low cost of money by bringing to market at the earliest opportunity all issues of funded debt preferred stocks whose proceeds will be needed within the near term future.

Equally strong continues the desirability of raising common stock equity funds needed within the next year or so by prompt offerings of additional shares to take advantage of current price-earnings ratios and dividend yields, which remain favorable to utility issuers.

* * * *

PERSONAL INCOME TAXES: It's unlikely that taxable income of many readers will be low enough to use the so-called "tax-table" and short form federal tax return, or to warrant separate rather than joint returns by husband and wife. However, older, retired relatives of readers may be in a situation where these questions apply.

In that case, they should bear in mind that the use of the "tax table" and short form, while involving less work, requires taking the standard deduction. Since itemized deductions may well exceed the standard deduction in the case of low-income taxpayers, the additional work involved in using the longer return may prove worthwhile as a means of producing tax savings.

Separate returns may be advisable in exceptional cases, for instance where the husband has the principal income and the wife has heavy medical expenses. Don't forget the usual age and gross income limitations on child dependents don't apply if the child is a student. Also, that where the taxpayer lives with a son or daughter (but not a wife) they can qualify for the considerably lower graduated tax rates applicable to the head of a household if the taxpayer pays a majority of the household expenses, regardless of descendant's age, and even though he or she fails to qualify as a dependent of taxpayer.

It's believed that employed persons (as well as those operating their own business) can properly deduct expenses relating to their employment such as club memberships and expenses; cost of membership in professional or business associations and cost of books, periodicals and newspapers containing information relating to their work (for example, subscription by an accountant to the Journal of Accountancy).

Gifts to fraternal associations are deductible as contributions if used by the association for religious or charitable purposes. Don't overlook the right to deduct casualty losses not recovered through insurance; such as uprooting or breakage of trees and shrubs in a storm—damages occurring frequently in suburban country homes.

NUMBER 17
Toll grade. These insulators are employed for all exchange circuits and for all toll and trunk circuits that do not exceed ten miles.

Dependable ...in emergencies

When they're on the line, you can *depend* on their strength and uniform high quality.

When you order you can *depend* on prompt deliveries of what you need . . . when you need it.

Since 1870, when Robert Hemingray began mass production of screw-thread insulators, Hemingray has pioneered most of the insulator developments to keep pace with the requirements of the communication systems of the world.

Today, as always, Hemingrays are world standard for quality, and most of the overhead telegraph and telephone lines of the world are carried on *dependable* Hemingray Glass insulators. They are a product of Kimble Glass Company, subsidiary of Owens-Illinois, Toledo 1, Ohio.

HEMINGRAY INSULATORS
AN (O) PRODUCT

OWENS-ILLINOIS
GENERAL OFFICES · TOLEDO 1, OHIO

MODERN FEATURES...

Telephone

Type VMC Recorder Announcer gives your subscriber the latest weather forecast (or any message up to 4 minutes long). This is only one of the many modern features available with Strowger Automatic.

another reason why Men Choose Strowger!

Modern features are important to the man who is selecting central office equipment. He knows that the system he buys today may have to trunk into different types of equipment and provide new services tomorrow. That's why so many telephone men choose Strowger Automatic. The simple circuits and unitized construction of Strowger enable it to *meet any demands, simply and economically.* It always has! Here are a few of the many, many modern features that Strowger Automatic can provide:

- 2L5N numbering
- Intertoll dialing with the latest supervisory standards
- Easy adaptation to Direct Distance Dialing
- Economical expansion with simple jack-in equipment
- Easy adaptation to automatic toll ticketing—and Strowger ticketing equipment works directly into accounting machines without converters
- Direct dial control—no delays for common equipment
- Most modern, fastest information boards
- Banks and wipers in plain view—easy to see and reach
- Low maintenance, fast call tracing
- Simplified checking—each switch and its control relays mounted as a unit
- Your choice of terminal-per-station or terminal-per-line
- Either frequency-per-group or per terminal, with terminal-per-station
- Trunk repeaters for carrier, microwave, physical, or composite circuits
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- Quick, easy testing of lines for leaks, grounds, or foreign battery, with the Automatic Line Insulation Routiner
- Remote testing of unattended offices
- Fully automatic alarm systems within office and at remote points
- "Four-wire" toll switching

ASK YOUR A.E. REPRESENTATIVE for further details! He'll be glad to help you in any way possible. And, he can show you how the modern features of Strowger will be important to you tomorrow. *Write Automatic Electric Sales Corporation, Northlake, Illinois. Or, call Fillmore 5-7111.*

AUTOMATIC ELECTRIC

A member of the General Telephone System—One of America's great communications systems

GENERAL TELEPHONE SYSTEM

TELEPHONY'S Traffic Engineering Handbook

By Gilbert R. Brackett

Jan. 25, 1958

Section 10 (Continued)
Equipment Nomenclature

Mechanical Switching Equipment

SELECTOR MULTIPLE. Parallel connected terminals of one or more selector banks, such as are used in dial offices. Selector Multiples correspond in a general way to the various multiples in a manual switchboard. Specific types of selector multiples are—"District Multiple," "Line Finder Multiple," "Connector Multiple," etc.

SUBSCRIBER LINE OVERFLOW CIRCUIT. An arrangement for counting the attempts to connect to a particular line or terminal hunting group while the line or group is busy.

TERMINAL HUNTING GROUP. A general designation for a group of lines in a dial system office so arranged that the switching equipment will search over the group to find an idle line.

TERMINAL HUNTING. The function performed by the switching equipment in a dial office in searching for an idle trunk.

SWITCHROOM. That part of the central office building which houses the selectors and associated apparatus in a panel or step-by-step office.

STEP-BY-STEP TOLL TRAIN. The selector switches in a step-by-step office through which toll calls are completed. There are two ways necessary for designating the particular switches in this train. The first, used in traffic studies and on other occasions where the type of selector is not of interest but where its place in the train is the essential, uses numbers corresponding to the numbers of equivalent selectors in the local train as follows:

Toll first selector.
Toll second selector.
Toll third selector.
Toll connector.

Since these terms do not designate the type of selectors, names have also been assigned for use where such designations are necessary. These follow:

(a) *Toll Transmission Selector.* A selector in the step-by-step toll train which furnishes toll grade transmission to the subscribers and controls the ringing.

(b) *Toll Preceding Selector.* A selector in the step-by-step toll train ahead of the transmission selectors. Where necessary, two or more may be used in tandem.

(c) *Toll Intermediate Selector.* A selector in the step-by-step toll train between the transmission selectors and the connectors. Where necessary, two or more may be used in tandem.

(d) *Toll Connector.* One of the final switches in the toll train which connects with subscriber's lines and which supplies machine ringing when started by a signal from a toll transmission selector.

COMBINATION LOCAL AND TOLL CONNECTOR (COMBINATION CONNECTOR). A connector which will operate either as a toll connector or as a local connector, depending upon whether it is picked up by the toll train or the local train.

HUNTING CONNECTOR. A connector in a step-by-step office which searches for an idle line in a PBX group or other groups of consecutive lines. There are two types: (1) Rotary hunting connector, which hunts over a maximum of 10 lines, all of which must be on the same bank level; (2) level hunting connector, used for large groups; it will hunt over several consecutive bank levels.

TWO-DIGIT ROTARY HUNTING SELECTOR. A step-by-step selector arranged for connecting to small number of lines or trunks and requiring the dialing of two digits for its operation. The first digit steps it up and the second steps it in to first trunk of the group and it then hunts for an idle trunk within the group.

OUT TRUNK SWITCH. A selector or switch arranged to hunt over a single group of out going trunks and to connect to an idle one.

SERVICE CODE SELECTOR TRAIN. The selector train in the step-by-step system which is used in reaching the service codes (113, 114, etc.) and to absorb preliminary pulses. The three switches in this train are—auxiliary first selector; service code selector; auxiliary service code selector.

LINE CONCENTRATING UNIT. An arrangement wherein a group of manual subscriber lines terminates on line switches, or line finders, which route their originating calls to a nearby switchboard and where calls to the lines are completed through connectors controlled by dials at the switchboard.

Line and Trunks

LINE. A general term used in communication practice in several different senses, the most important of which are:

(a) The conductor or conductors and supporting or containing structures extending between subscriber stations and central offices, or between central offices whether they be in the same or different communities.

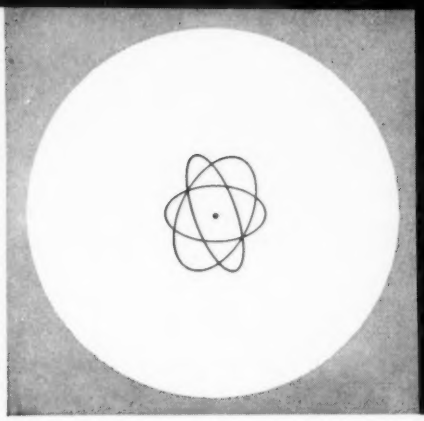
(b) The conductors and circuit apparatus associated with a particular communication channel.

(c) Any communication channel between two points disregarding the method of its derivation.

DIAL SYSTEM SUBSCRIBER LINE. Any subscriber line terminating in a dial office, either on the regular dial equipment or on the dial system "A" board.

TRUNK. A communication channel used as a common artery for traffic between switchboards or other switching devices. This term applies to both exchange and toll plant.

(Section 10 will be continued next week)

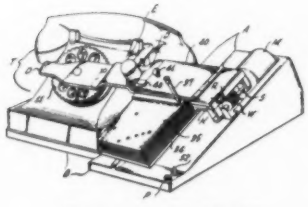


TELEPHONY'S ELECTRONICS SECTION

BY HAROLD B. McKAY, ELECTRONICS EDITOR

AUTOMATIC DIALING

DEVICES for automatically dialing numbers on a telephone have long appealed to the imagination of inventors. A new machine for doing this has just been patented by the versatile Lee DeForest. It consists of a motor driven "finger" which actually turns the telephone



Patent No. 2,813,913

dial, hence does not require an electrical connection to the line. The number dialed is determined by selecting one of a pack of punched cards that are included in the device.

These cards shown as number 35 in the accompanying figure, pivot on post 37. In use, the proper card is selected, the cover plate 40 is lifted, and the card swung into place. A motor M operates a gear train which drives the dial by means of the finger 10. As the dial turns, a set of brushes sweep along the undersurface of the card, and stop the dial when the correct number is reached, by means of electrical contact through the holes in the card.

The patent number is 2,813,931.

THE "PERSISTOR"

WHEN certain materials are cooled to near absolute zero, they exhibit "super-conductivity," that is, they lose practically all resistance. An electric current can be set up in these materials, and it will continue to circulate around indefinitely. This can be made into a memory device for computer or similar applications.

The Ramo-Wooldridge Corp. uses this principle in its "Persistor," which is a miniature bimetallic printed circuit which operates at minus 459.6 degrees Fahrenheit. It requires little power for operation and has a switching time of 1/100 millionths of a second.

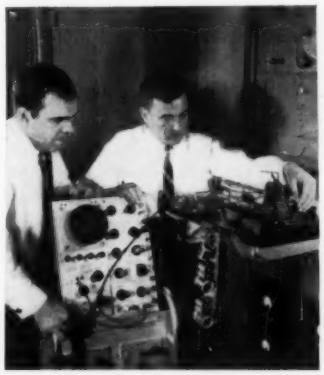
The Persistor is essentially a loop composed of segments of two metals. One segment of the loop is designed so that it would change from super-conductivity to normal resistance by the passage of a small amount of current. A sub-critical amount of current is introduced into this metal, and it continues to circulate for a long period. The direction of the current represents the information stored. The direction of the current may be later checked and the stored information read back by applying an interrogating pulse.

Half a million Persistors will be able to operate in a space of only one cubic foot in a computer.

WELDED CONTACTS

HAVE you ever wondered what makes relay contacts weld together? It has long been thought that such things as the amount of energy dissipated in an arcing contact had something to do with the welding, but Bell Telephone Laboratories has found out that this isn't so.

Actually, the weld is formed at the instant the arc goes out. J. L. Smith and W. S. Boyle, of the laboratories, conducted experiments with various short lengths of charged transmission line. It was found that the arc produces a small pool of molten metal on the contact surface. When the arc is extinguished, the field is redistributed and the molten metal is drawn across the gap, resulting in a weld.



This is the way scientists study the arcing of relay contacts. The conglomeration of coils hanging from the shelf is a simulated transmission line.

The extinguishing of the arc results from an instability which arises from the fact that the diameter of the pool increases as the cube root of the arc's energy, but the heat losses rise linearly with the diameter. This means that if the current in the arc remains constant, the large heat losses will ultimately quench the arc. It is at this instant that welding of the contacts occurs.

THE "TWISTOR"

ANY electronic telephone exchange of the future will probably have some kind of a memory or register circuit to store a dialed number while a call is being completed, and

will probably need other memory circuits for decoding, marking, translating and routing, even as do present-day common control crossbar offices.

Many of the devices which will be adapted to telephone work are presently being developed in the business machine or computer field. In fact, it might be said that the automatic telephone exchange is the original mechanical brain.

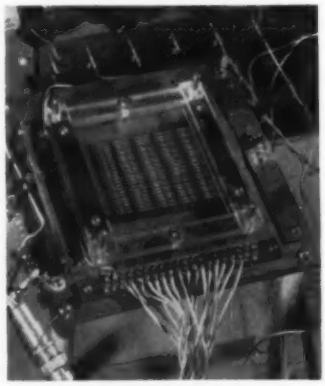
Among the storage, or memory circuits, which have been developed for computers is a matrix of cross threaded wires, each intersection of which was enclosed in a tiny ring of a ferrite magnetic material. "Bits" of information were stored in this matrix by sending current through the wires which would cause a magnetization of certain of the ferrite rings. Other variations of the same idea used ferrite sheets. Each of these methods required either a threading or a plating operation to make up the matrix.

Now the Bell laboratories have come up with a gadget called the "twistor" which completely eliminates the ferrite material. It is made up of a group of horizontal copper wires interwoven with vertical wires of a magnetic material, much as a window screen is woven. Thus it is much the same as a ferrite core matrix, but without the ferrite.

A characteristic of magnetic wire is that it shifts its preferred direction of magnetization from a longitudinal path to a helical path when torsion is applied. Thus, in a memory made in this fashion, current through the magnetic wire would result in a circular magnetic field.

In operation, a current pulse through the magnetic wire would create the circular field. A pulse through the copper wire would create a longitudinal field which would be at right angles to the copper wire. The result would be a combined circular and longitudinal field, and this condition would amount to storing a "bit" of information at the point where two particular wires intersected.

The signal could be recovered, or "read out," by over driving the longitudinal field in the reverse direction. The system has the advantage that the magnetic wire is both the storage device and one of the conductors.



This is an experimental matrix used to test the "Twistor" principle of magnetic memory. Tiny coils provide a longitudinal field for magnetic wires.

Experiments are being made with magnetic plated wires. Diameters as small as one-thousandth of an inch appear feasible. At least 10 bits per inch can be stored on the wire without adverse interaction.

DELAY DISTORTION

DELAY DISTORTION is one of the problems which must be overcome in sending data pulses or slow scan TV over telephone wires. This is a condition whereby different frequencies are delayed or retarded by the cable facilities by different amounts. That is, some frequencies will be transmitted slower than others. This can result in "ghosts" in connection with telephotograph transmissions, and can cause a phase shift which will limit the data handling capacities of a circuit.

An approach to this problem is described by B. P. Bogert of the Bell Telephone Laboratories in the "Transactions of the IRE." Because the phase delay is a condition of time difference, it is proposed that a time reversal device be used to correct the shift.

Thus, on a long circuit, a delay which had accumulated up to the half-way point could be cancelled out if a time reversal device could be placed at that point. In this manner, the delay in the second half of the circuit would offset the delay in the first half. This was proved experimentally by the use of a tape recorder on which the transmitted data, complete with delay distortion, was recorded. The tape was then played backwards over the circuit and the delay distortion was corrected.

While this method was not offered as a final solution to the problem, the experiment is interesting because it indicates the transmission improvement which can be expected when a practical device is developed.

MUSCLE ELECTRICITY

EXPERIMENTS with animal electricity are as old as the study of electricity itself. The electricity produced by the heart and the brain has long been used in diagnostic work by the medical profession. It has even been suggested that the day will come when a patient may consult his physician over the telephone and transmit his heart and nerve impulses over the wire for analysis.

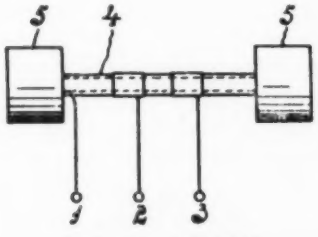
The physics department of Guy's Hospital Medical School in London has been experimenting with the potentials developed by human muscles. The tiny voltages developed,

which range in frequency from two cycles to 600 cycles can be displayed on a cathode ray tube screen. Connection may be made to the muscle by means of external contacts, or needles placed in the muscle.

The technique of "electromyography," as it is called, is described in the October issue of *Technique*. You can get on the mailing list for this quarterly by writing to Muirhead Instruments, Inc., 677 5th Ave., New York 22, N. Y.

MECHANICAL FILTER

FILTERS for passing or rejecting different frequencies are usually made up of resonant combinations of coils and condensers. Carrier filters are made in this fashion. A less costly approach for higher frequencies and in other applications has been the use of mechanical filters—devices which would resonate or vibrate mechanically at the required frequency.



Patent No. 2,803,803

A recent patent, No. 2,803,803 (see cut), issued to Gerard Jonker, and assigned to North American Phillips Co., applies the principle of electrostriction to the design of a rejection filter for the audio range. The filter consists of a piece of material, such as barium metatitanate, which permanently polarizes by the application of a high voltage across the electrodes. The frequency response of the rod is altered by the use of weights at each end which permits a small-sized unit for audio frequencies. (Otherwise the long audio wave-lengths would require an unwieldly length of rod.)

If an alternating potential of the correct frequency is applied between electrodes 1 and 2, the rod will vibrate and a similar potential will appear at 1 and 3. This can be used in a negative feedback circuit to cancel out all ac of the frequency at which the unit vibrates. If this principle is adapted to telephone carriers, savings in space and cost might result.

L.D. CALLING SPUTNIK

LONG DISTANCE telephone conversations of the future may make "one-cushion billiard shots" off earth satellites to provide virtually direct communication with all parts of the globe, a pioneer radio scientist at Federal Telecommunication Laboratories, Nutley, N. J., predicted recently.

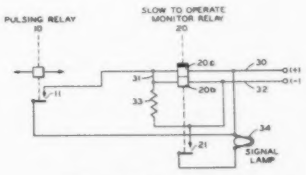
"Present problems of communicating over mountains or oceans could be bypassed simply by aiming radio signals at the smooth 'skin' of a satellite, which will 'carom' a portion of the signal directly to the receiving station," according to Richard E. Gray of the Nutley research center for International Telephone & Telegraph Corp.

Gray made the comments in an address to the Army Reserve's 352nd Signal Battalion and 311th Signal Support Company during an all-day drill session at the USAR Training Center, 641 Washington St., New York City. Both reserve units are sponsored by IT&T.

The technique envisioned by Gray would utilize microwave—ultra-short wave — radio equipment now available. Directional, "dish-shaped" antennas would focus the microwaves in a concentrated beam directly at the satellite. The highly-reliable radio impulses would be reflected in all directions, but a large percentage of them would blanket the earth, where sensitive high-gain antennas would receive them with no difficulty.

PULSE MONITOR

THERE are many applications for regularly produced electrical impulses, ranging from telephone circuit interrupters to life-testing machines for components. To insure reliable performance of circuits employing such pulses, an alarm of some sort is required in order to call attention to a possible failure



Patent No. 2,812,513

of the pulses. In some applications, a failure of the pulse to make would be as important as a failure to break.

Patent No. 2,812,513, issued to Arnold Breggin and assigned to General Dynamics Corp., gives the circuit design of an alarm system which will detect either a make or break period which has an abnormal timing period.

In the accompanying drawing, a pulsing relay 10, with contact 11, responds to the interrupter to be monitored. The monitor or alarm relay 20 is supplied with dc from the plus and minus terminals. The windings 20a and 20b are in series opposition in this circuit and the relay does not operate from this current path. However, the resistor 33 shunts the winding 20b to some degree. This decreases the current in 20b and the relay tends to operate in one direction on the flux produced by winding 20a.

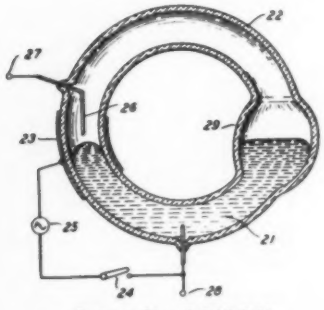
When the pulse contacts 11 are closed, winding 20a is shorted, and then the relay tends to operate in the opposite direction by the flux caused in winding 20b.

Thus, the relay tends to operate in one direction or the other as the pulse contacts open and close. The slow operate feature of the relay prevents any operation while the pulses continue, but if they should fail, the monitor relay will operate and energize the lamp or other alarm feature.

ELECTROSTATIC RELAY

RELAYS with wound coils are current-operated devices, and these are the kind that telephone men work with. However, it is possible to close an electrical contact by means of voltage alone, and without the use of current flow.

Patent No. 2,802,918 (see cut) utilizes the principle of a column of



Patent No. 2,802,918

mercury 21 in a glass tube 22, which is surrounded by a metal bracelet 23. When the switch 24 is closed, ac flows from source 25 to the electrode 28 and the bracelet 23, but no current continues because the circuit is open.

The mercury column is pulled up, however, by the electrostatic attraction and makes with contact 27, just as any relay contact would make. The illustration shows the use of an alternating potential to operate the relay, but a dc voltage could also be used.

The patent was issued to W. S. Boyle and assigned to the Bell Telephone Laboratories.

RETURN LOSS

IN TELEPHONY'S recent series of articles on "Data Transmission" reference was made to the "return loss" in the calculation of transmission efficiency on telephone lines. The condition which gives rise to different amounts of return loss on a telephone line has to do with how well the load is matched to the line. This condition also concerns the power engineer who recognizes "power factor" and the radio engineer, who talks in terms of "standing wave ratio."

Because all of these phrases relate to the same kind of an electrical condition, we asked the Bell Telephone Laboratories to give us an explanation of the difference in the usage of the words. The reply was not received in time to include in the articles, so is presented now, as follows:

"The concept of return loss is applicable to radio engineers as well as to telephone engineers, since both are usually interested in obtaining the maximum received energy which a given system is capable of delivering. They are also usually interested in transmitting a band of frequencies and not just a single frequency. The return loss concept does not, however, fit into power engineering, since the power engineer is not usually concerned with the maximum energy that a system can transmit, but how to transmit the energy efficiently so that the received power is as large a ratio of the input power as economics will permit.

"Thus, power factor correction is not the same as obtaining a high return loss. The object in power factor correction is to raise the load impedance and thereby reduce line currents and so reduce the line losses. In telephone and radio work, the usual aim is to match the load impedance to the line to decrease the reflected wave. Perhaps the following example will indicate the relationships between return loss and standing wave ratio.

"Assume a smooth ideal transmission line with a mismatched termination. The return loss measured at the input terminals of the line is composed of two parts; one is the reflection factor at the distant termination, and the second is the round-trip attenuation from the input of the line to the mismatch and back. The reflection factor is given as $\frac{Z_t - Z_o}{Z_t + Z_o}$ (voltage or current)

Thus, a termination which has an impedance 20 per cent higher than the line characteristic impedance will reflect

$$\frac{1.20 - 1.0}{1.20 + 1.0} = \frac{.20}{2.20} = 9.09 \text{ per cent.}$$

This gives a reflected wave 20.4 db below the incident wave. If the line has an attentuation of 5 db, the return loss measured at the input will be the return loss of the mismatch plus the round-trip line loss. Thus, this line would at its input measure 30.4 db return loss.

"The radio engineer's standing wave ratio is a different method of expressing the same phenomenon. A type of measurement that can usually be made at radio frequencies is the ratio of the voltage at points along the line where the incident and reflected waves add and at adjacent points where they subtract. The ratio of the sum to the difference of these two waves is the standing wave ratio. Thus, in the example above, the standing wave ratio close to the termination is

$$\frac{1 + .0909}{1 - .0909} = 1.20$$

"For a perfect match between line and termination, the return loss will

be infinite and the standing wave ratio 1.00.

"Telephone engineers sometimes speak of the structural return loss of a line. The term is usually applied to coil loaded pairs. It is the return loss measured at the input of a line when that line is terminated in its nominal characteristic impedance. If the line were perfect, the return loss would be infinite, but because of deviations in capacitance, loading coil spacing, loading coil inductance, wire diameter, etc., a finite return loss will always be measured. This return loss represents the deviation of the line impedance from its ideal or nominal value.

"Because the reflections vary with frequency, and thus the return loss varies with frequency, the structural return loss usually applies to an average value measured over an appreciable bandwidth such as the voice band. The structural return loss fixes the maximum two-way gain that can be inserted in a line without causing singing.

"The more the return loss the more gain can be added and thus the lower net loss at which a two-way circuit can be operated. Care taken to make lines uniform pays off in a better transmission characteristic and gives the opportunity to operate the line at a lower overall loss."

MECHANICAL OSCILLATOR

WHILE science is busy making faster electronic switches, the low speed mechanical interrupter or chopper is not yet obsolete. Devices of this sort are widely used in telephone offices, and are also used to switch or sample currents in other devices, and to convert dc to ac for measurement or amplification.

A new device for this type of switching is a mechanical oscillator made by the Applied Science Corp. of Princeton, N. J. It consists of 9,000 rpm motor and a commutator with three make-before-break channels. Adjustable graphite brushes will handle one ampere, and can alter the pulse width as required. The whole unit comes in a sealed package weighing less than a pound.

•

AN ELECTROMETER which has a full scale range of 30 millivolts, and a current range of 300 millimicroamperes is now made by General Radio of Cambridge 39, Mass. It is called the type 1230-A D-C Amplifier and Electrometer.

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UTILITY RATES AND STATE SOCIALISM

Reprinted from a Shreveport (La.)* Times *editorial on Southern Bell Telephone & Telegraph Co.'s rate case in Louisiana.

"The Louisiana Public Service Commission, now holding hearings on the request of Southern Bell Telephone for certain rate increases, has denied the company's plea for an immediate emergency $7,000,000-a-year hike pending final commission decision on its entire plea.

"Chairman Nat Knight said, however, that the commission would act on the request at once, during the hearings, whenever it felt that the company had made a satisfactory case for the emergency increase, which would amount to an average of only three cents per day per telephone service consumer.

"The commission thus leaves the way open to quick action at any time, which is well.

"But there is another angle to the hearing that is not 'well.' That is the statement, *before* the hearings opened, by Commissioner John McKeithen of the North Louisiana Public Service District that the company's slowdown on expansion of service and facilities is "playing right into the hands of those who advocate public ownership of all public utilities."

"On the contrary, if the public service commission, by its rate setting, keeps Southern Bell in the position of having to pay more in interest rates for money it borrows for expansion than it can in return on that borrowed money, *it will be the public service commission* that is 'playing right into the hands of those who advocate public ownership of all public utilities.'

"*And that means playing right into the hands of socialism and the socialist state.*

"No company, public utility or otherwise, can continue to operate without adequate revenue. The result of such operation automatically would be (1) insolvency, (2) deterioration of service in a manner to place the hardship on the consumer, or (3) in the case of public utilities, socialistic operation by the state, which invariably means inadequate service and extravagant tax-paid operation when on a statewide basis in such a big operation as telephone service—although it may work at lesser governmental levels and services.

"Deteriorating and inadequate telephone service, as the alternative to insolvency or public ownership, would hit the entire economy of the state—its industrial and commercial expansion and prosperity and thus its payrolls and standards of living.

"In other words, the present company course of having to pay more for borrowing than it can earn on such borrowing—and all big public utility expansion must be carried on through borrowing, in the same manner that big industry must borrow to expand—is a green light on the road to public ownership, which inevitably is in the direction of state socialism.

"The telephone company's fiscal and rate structure position, as brought out clearly in its public evidence as well as in past commission hearings, briefly is this:

"(1) Southern Bell Telephone this year borrowed 70 million dollars for expansion and was compelled to pay a rate of $4.91 interest per year per $100 of this borrowing. Its revenue represents a return of only $4.24 per year for $100 borrowed. Under this situation, the more the company spends to maintain and improve and expand service to the people, the deeper in the hole it goes.

"(2) The present rate structure established by the commission through past rate *reductions*—when the company pleaded for *increases*—is far below the earnings allowed other Louisiana utilities by the commission and earned by them. And in Louisiana there is no place where the consumer's dollar goes farther than in such utilities as telephone, gas and electricity.

"(3) This rate structure and its earning potentials are too low to attract investment money necessary to improve telephone service as needed and demanded by the public, particularly by the ever-expanding business, commercial and industrial interests of Louisiana.

"(4) The present Southern Bell Louisiana earnings are below the earnings of the company in any other state in which it operates. They also are below the earnings of any other Bell System company anywhere in the entire United States.

"Continuation of these conditions clearly is the path to public ownership. That fact should be foremost in the minds of all commission members, for the commission not only has the duty of protecting the people against exorbitant public utility rates, *but it also has the duty of guaranteeing an open door to fair profit by all utilities under its jurisdiction and thus of helping maintain business and industrial welfare on which the state's payrolls and prosperity rest so strongly.*

"No one questions the integrity of the commission members or their determination to do what they believe is best for all concerned in this or any other rate hearing. But there should be no confusion as to which direction in this particular case is the direction of public ownership—and thus of state socialism."

Anchorage System Now Under U. S. Army Alaska

Management and operation of the Anchorage communication facilities of the Army's world-wide communication system was transferred on Jan. 14 to the Commanding General, United States Army Alaska from the Commander, U. S. Army Alaska Communication System. The joint announcement was made Jan. 14 by Maj. General Gilman C. Mudgett, Commanding General, United States Army Alaska, and Col. Carl H. Hatch, Commander of the U. S. Army Alaska Communication System.

This transfer of communications facilities of the Army Command and Administrative Network at Anchorage, is in accordance with Department of the Army policy to place strategic communications under the control of the appropriate army commander. On its completion, the primary mission of the U. S. Army Alaska Communication System will be to provide public offering type communications.

This shift of responsibilities does not affect the telephone and telegraph service that the Alaska Communication System has traditionally provided for the general public of the territory.

Courts and Commissions

Rules Against Directory Reprinting in "Error" Case

It would be "inequitable" to force the New York Telephone Co. to reprint 889,000 copies of the 1958 Brooklyn classified directory simply because listings allegedly applied for by one subscriber were left out, Justice James C. Crane ruled recently in Brooklyn Supreme Court (TELEPHONY, Jan 11, p. 54).

Seymour R. Bittner, who maintains three small Brooklyn firms was the plaintiff. In demanding a reprinting and redistribution of the directory, he said omission of listings and advertisements that he requested might cost his companies $25,000 this year in lost business.

Justice Crane ruled against Mr. Bittner after hearing telephone company representatives outline the magnitude of a reprint run of the directory.

Although ruling against the requested reprinting, Justice Crane set Feb. 3 for trial to assess damages suffered by Mr. Bittner's firms.

Minnesota Company Buys Eight Small Systems

Approval of the purchase of the rights-of-way and easements of eight small telephone systems by the Arvig Telephone Co. of Pequot was given by the Minnesota Railroad & Warehouse Commission on Dec. 16.

The eight small companies, which operate in the vicinities of the Arvig company's exchanges, had asked Arvig to take over their service areas. They serve a total of 406 stations.

Following are the companies the Arvig company will take over:

Woodrow Township Telephone Co., Birch Lake Township Telephone Co., Hiram Township Telephone Co., Ponto Lake Township Telephone Co., Powers Township Telephone Co., McKinley Township Telephone Co., Bull Moose Township Telephone Co., and Deerfield Township Telephone Co.

The commission also approved a rate increase for the Backus and Hackensack exchanges of the Arvig company, which it purchased early in 1957. The company has been granted an REA loan to rehabilitate the two exchanges and convert them to automatic operation. The new rates approved by the commission are for dial service, and cover extended area service between Backus and Hackensack and between Backus and Pine River, another exchange of the Arvig company. The new net dial rates for Backus and Hackensack follow:

	Backus	*Hackensack*
BUSINESS		
One-party	$7.00	$6.75
Two-party	6.00	5.75
Rural multi-party	5.75	5.50
Rural resort—seasonal	51.75	49.50
RESIDENCE		
One-party	4.50	4.25
Two-party	4.00	3.75
Four-party	3.25	3.00
Rural multi-party	4.25	4.00
Rural cottage—seasonal	38.25	36.00

California Hearing Dispute Heads For Court

After the California Public Utilities Commission denied on Jan. 8 a request by the cities of Los Angeles and Long Beach for a rehearing on a recent $15,271,000 rate boost, Los Angeles City Attorney Roger Arnebergh said the case would be appealed to the state supreme court (TELEPHONY, Jan. 11, p. 52).

The commission said it denied the rehearing because five full days of public hearings had been held, with both cities participating. Arnebergh contended, however, that the cities had not been given sufficient time to present their evidence.

The commission's decision on which the contested number of hearings was based affects telephone subscribers in the Los Angeles extended-service area of more than 450 square miles. In general, it boosts message unit calls by about 4½ cents per unit. It does not affect monthly exchange rates for local calls.

The commission ruling also rejected rehearing requests made by 10 individuals.

The four companies benefiting by the interim rate increase are Pacific Telephone & Telegraph Co., which receives $11,288,000 additional a year; General Telephone Co. of California, $3,125,000; California Water & Telephone Co., $799,000 and Sunland-Tujunga Telephone Co., $68,000.

PT&T and General both have applications for further rate increases pending before the commission. PT&T is seeking about $40 million, while General is asking $11,025,000.

The interim revenue increases allowed both companies may or may not be deducted from the possible over-all boosts for which the companies are separately presenting testimony in current hearings.

Southwestern States Asks Louisiana Rate Increase

Louisiana Public Service Commission on Jan. 7 took under consideration a petition by Southwestern States Telephone Co. for a $211,640 annual rate increase in Louisiana.

Company officials testified that during the year ending last June 30, Southwestern earned a return of only 2.7 per cent on its Louisiana investment. It wants a 6 per cent return.

City Tax Formula Announced in Arkansas

A formula for figuring municipal franchise taxes to be paid in Arkansas by Southwestern Bell Telephone Co. was fixed on Dec. 10 by the Arkansas Public Service Commission (TELEPHONY, Nov. 2, 1957, p. 42).

The commission made it clear it was not telling the cities how much special tax they could levy against Southwestern Bell. It directed, however, that any tax amount in excess of that fixed by the formula should be passed on to customers in the city which levies the excessive tax.

In announcing the formula, to take effect by Jan. 15, the commission directed the company to present facts and figures on the taxes it pays the

(Please turn to page 50)

AUTOMATIC ELECTRIC HAS THE RIGHT SUPPLIES FOR YOUR OPERATIONS!

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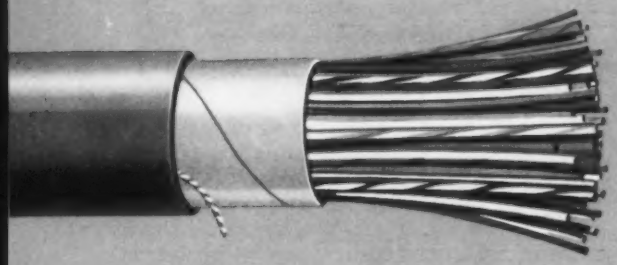
Automatic's supply service provides a complete line of equipment for you to choose from...Pole Line Hardware... Cable & Wire...Large & Small Tools... Protective Equipment and many other items. And, Automatic really shines when it comes to delivery. Your order is almost always picked from stock and shipped the same day.

Shown here is one of our many supply items—it should fit nicely into *your* operations.



Automatic's Five Friendly Warehouses:

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Richmond 21, Va.
Elgin 8-9280

Fran Satcher, Mgr.
158 Corliss Avenue
Johnson City, N. Y.
Binghamton 7-8507

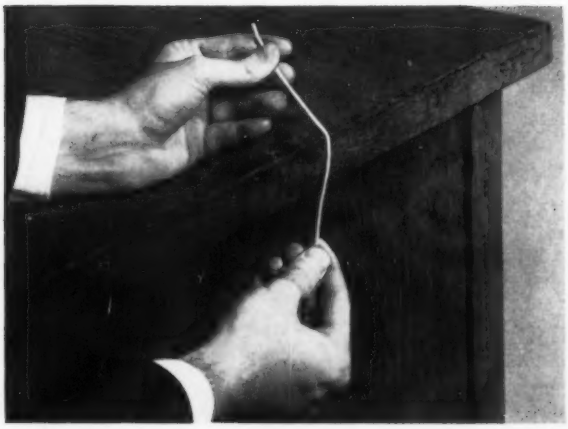
Robert Miller, Mgr.
2021 Main St.
Kansas City 8, Mo.
HArrison 1-4720

George Ferguson, Mgr.
Northlake,
Illinois
Fillmore 5-7111

Ed. J. Chok, Mgr.
2360 N. W. Quimby St.
Portland 10, Ore.
CApital 3-7244

3 TESTS

IS TOUGHER...



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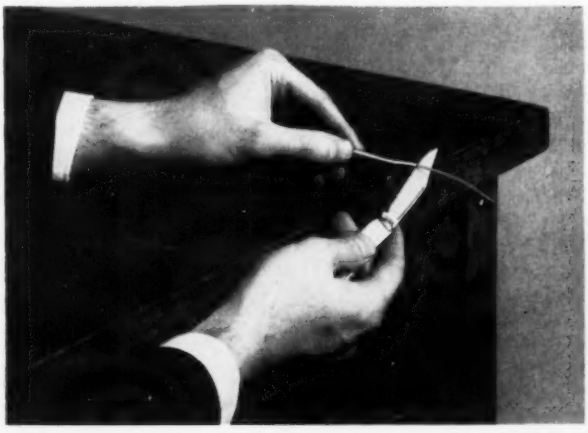
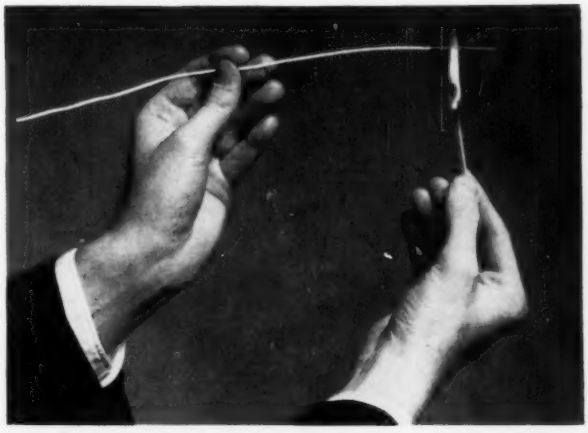
PROVE AUTOMATIC'S NEW PLASTIC SWITCHBOARD CABLE...

FASTER TO SOLDER...



2 Skin it! See how quickly the conductor is ready for soldering. *No time is lost scraping enamel.* No frayed ends to create fire hazards or collect dust.

WON'T SHRINK



3 Heat it! Hold a lighted match to the bared end of a conductor. The plastic adheres without any appreciable shrinkage. Here's proof that the polyvinyl-chloride insulation won't shrink during soldering.

YOU'LL BENEFIT FROM ALL THESE FEATURES, TOO!

COLOR CODING. As many as three separate colors are bonded together—*extend clear through the insulation.* They won't run together or fade—ever. This color coding *speeds* identification, *saves* installation time.

STRONG PLASTIC JACKET. A moisture-resistant jacket protects the fully color-coded core from shipping and installation abuse. To speed stripping, the jacket is easily separated by pulling a built-in nylon rip-cord.

BETTER COMPRESSION RESISTANCE. Twice that of textile, five times that of earlier plastics, under normal conditions.

INCREASED DIELECTRIC BREAKDOWN STRENGTH. Three times greater than textile, under humid conditions.

GREATER INSULATION RESISTANCE. At least 10 times that of textile, under humid conditions.

Made by General Cable Corporation, to our specifications, this new all-plastic switchboard cable is winning fast acceptance as *the* cable for switchboard wiring applications. If you would like to learn more about this new cable, consult your Automatic representative or your nearest A. E. Sales Corporation warehouse. They'll gladly be of service.

AUTOMATIC AE **ELECTRIC**

A member of the General Telephone System—One of America's great communications systems

GENERAL SYSTEM

various cities so the commission could determine if any discrimination existed among them.

The commission said in its order it had determined from the evidence that discrimination did exist and "will likely become more serious."

"The only way this unlawful discrimination can be eliminated," the order said, "is for the commission to order the company to pass on to telephone users any excess city special taxes which may be levied against the company by any city in the state of Arkansas. . . .

"If the utility does not pass (on to the customers) these excess city special taxes it will become a part of the statewide operating expense and result in loading an additional amount of operating expenses to be borne by all subscribers of the utility, many of whom live elsewhere than in the taxing municipality."

The commission said that the taxes charged by the cities ranged from nothing to $75,000 a year. "There is no logical relationship between the amounts of such taxes, nor do such taxes in any way relate to the size of the cities and towns, the number of telephones located therein, or to any other discernible feature," it added.

The commission said it had decided that the formula should be a tax per telephone ranging from 80 cents for the smaller cities to $1.07 for the larger ones.

Representatives of a number of cities attended the hearing on the formula and indicated some of them might test the ruling in the courts.

The Arkansas Municipal League recommended at its recent convention that each city adopt an ordinance requiring private utilities to pay 4 per cent of their gross revenues within the city. The league said this would be standard and would eliminate any discrimination.

Utility Relocation Issue Raised in Tennessee Case

A case challenging the constitutionality of a Tennessee law requiring the state to pay for moving utility facilities on interstate highways was taken under consideration in Nashville by Chancellor Ned Lentz after hearing arguments on Jan. 6.

Attorneys for the state argued that the law would give utilities "two free rides at the expense of taxpayers."

Southern Bell Telephone & Telegraph Co. was named as defendant in the suit, which was filed by State Highway Commissioner William Leech.

Assistant State Attorney General James M. Glasgow said the utilities now are on rights-of-way belonging to the state at the state's permission.

George Lewis, Jr., attorney for Memphis Street Railway, said that whether the law was upheld was a matter of "life or death" with that firm. He said planned expressways would cost the company about $828,999 if it had to pay for moving its facilities. He added that this would bankrupt the company.

Neb. Commission Approves Discontinuance of EAS

On Dec. 27 the Nebraska Railway Commission approved the discontinuance of extended area service from Morse Bluffs to Cedar Bluffs and from Weston and Malmo to Wahoo effective with the conversion of Cedar Bluffs and Wahoo to automatic operation.

Morse Bluffs, Malmo and Weston are owned by the Citizens Telephone Corp. of Blair. Cedar Bluffs and Wahoo are exchanges of The Lincoln Telephone & Telegraph Co.

On the same date extended area service was ordered discontinued between the Page exchange of the Public Telephone Co. and the Walnut exchange of the Walnut Telephone Co., effective with the conversion of the Page exchange to automatic operation.

United Gets Rate Increase In Kansas

The United Telephone Co. of Kansas has been given a temporary annual rate increase of $296,130 by the Kansas Corporation Commission. United serves 38 Kansas exchanges (TELEPHONY, Nov. 30, 1957, p. 55).

The increase will be collected under bond with provisions for refunds if the new rates are found excessive following a formal hearing on Feb. 3.

Asks to Sell Stock

The Twin Lakes Telephone Co., of Branson, Missouri, has asked the Public Service Commission for permission to sell 500 shares of preferred stock for $50,000.

The company said it wanted to sell the stock at $100 per share to residents of communities it serves. The money would be used for improvements of its plant.

NET&T Asks Increase

A petition filed with the Vermont Public Service Commission on Jan. 10 by the New England Telephone & Telegraph Co. requested a 1.5 million dollar annual increase in Vermont rates, effective Feb. 10.

Lincoln Company Ordered To Provide EAS

The Lincoln Telephone & Telegraph Co. was ordered by the Nebraska Railway Commission on Dec. 17 to provide extended area service from its Bennet exchange to Lincoln. A cross-application filed by the company in opposition to this service was denied. Extended area service from Bennet to Palmyra, Hickman and Panama will be continued.

Rates for Bennet customers will be increased as follows: B-1 rates from $7.65 to $11.15; R-1 from $3.50 to $4.50; rural from $3.15 to $3.95, with corresponding increases for other service.

The commission ordered the service to become effective Sept. 1, 1958. Installation of facilities will cost the company $16,570 and the total annual deficit due to reduction in toll revenue and increased operating costs unsupported by increased earnings will be $3,692.

OK's Tariff to Bell Subscribers City Tax

The Northwestern Bell Telephone Co. on Dec. 20 was authorized by the Nebraska Railway Commission to revise its general rules and regulations to provide "that when a city or village of a rate group wherein there is more than one exchange, imposes upon the telephone company an occupation tax, license tax, permit fee, or franchise fee, such tax or fee shall be billed pro rata to the exchange customers receiving service within the territorial limits of such municipal corporation."

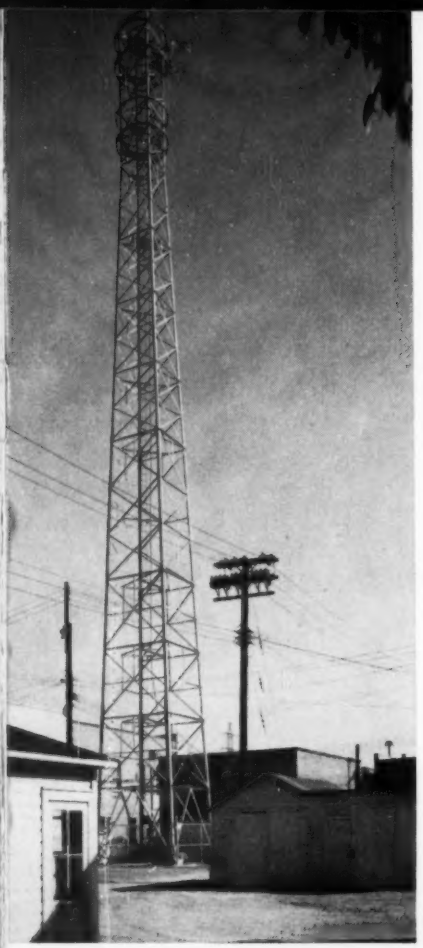
The commission denied the company's application to establish a general method to determine costs and appropriate charges for special services.

Authorize Purchase Of New York Independent

The New York Public Service Commission on Jan. 15 authorized Chenango & Unadilla Telephone Corp., of Norwich, to purchase the plant and system of Farmers Union Telephone Co. of Gilbertsville, for $16,900, and to operate a telephone plant in the territory now served by Farmers Union.

Farmers Union furnishes magneto telephone service to about 330 subscribers in the towns of Butternuts and Morris.

About 27 per cent of the telephones



AT LORAIN, OHIO . . . a 150 foot tower built to allow future service to tributary offices of Amherst, Birmingham and Vermilion. In spite of the difficulty of erecting a tower in a densely populated area, the job was completed on schedule with no special problems.

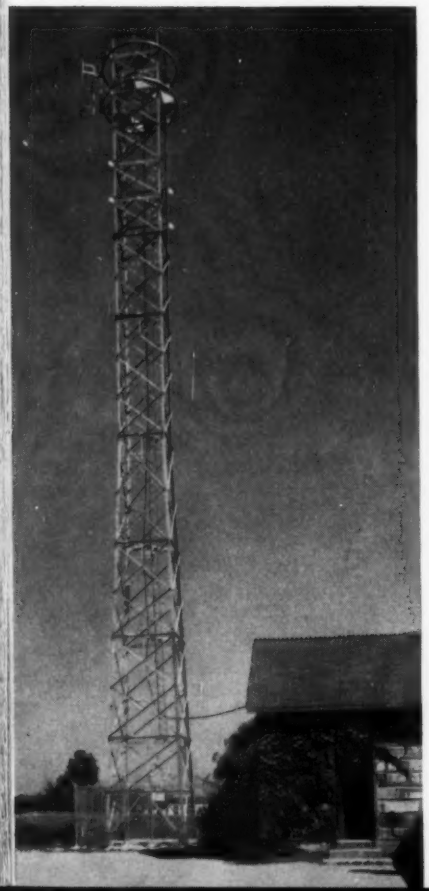
Lorain Telephone Company uses Blaw-Knox Microwave Towers to expand service... open alternate route

Because the present cable route is vulnerable to traffic damage, the Lorain Telephone Company has just completed a supplemental microwave route to assure trouble free service and expand current facilities. Operating between Lorain and Avon Lake, the new microwave system now serves 4,800 of the company's 36,900 customers.

In providing continuous service to an ever growing number of customers, this progressive company relies on Blaw-Knox for tower dependability and tower adaptability. Erected by the Radio Construction Company, these durable microwave towers are built to withstand severe weather conditions.

A microwave system may be the cost cutting answer to your own expansion plans and a practical approach to even better customer relations. Blaw-Knox offers services that include: adapting towers to sites, engineering towers to *established* specifications, modern fabrication, and experienced erection assistance.

For details write for Microwave Tower Booklet 2538.



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Guyed and self-supporting towers for Microwave, AM, FM, TV, Radar, Communications . . . Transmission Towers . . . Parabolic Antennas . . . Special Structures. All custom built to meet your requirements.

AT AVON LAKE, OHIO . . . a 100 foot tower operates 11 miles from the companion tower at Lorain. Note ring mounts permit additional antenna to be easily installed . . . allow precise 360 degree orientation. Blaw-Knox towers maintain rigid requirements for torque and deflection.

NOW! Check your Line Losses Easily . . .

End Customer Complaints of Poor Transmission

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Use This Portable Type C16A

TRANSISTORIZED 1000-CYCLE GENERATOR AND DECIBEL METER

Take your own direct circuit readings from either end of cable —from any cable terminal to determine loading values.

Check and locate trouble in carrier systems and audio circuits.

Case measures 9½" long, 6¼" wide, 3¾" high. Weighs only 4 lbs.

Equipped with test terminals and test leads with clips—also jack for oscillator plug—meter scales read —10 DB 0 DB +10 DB.

Oscillator measures 2¼"x3"x4" and weighs 10.3 ounces.

Will operate 700 hours continuously—much longer, intermittently on self contained 2 cell mercury battery.

Sold through all telephone equipment suppliers—attractively priced—complete set $148.00 FOB Chicago, Ill.

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it serves are subscriber-owned. C&U operates in areas adjacent to Farmers Union territory.

In seeking permission to sell its plant to C&U, Farmers Union said it was unable to finance necessary improvements or to modernize its equipment.

C&U officials plan to convert the plant to automatic operation by 1961 at an estimated cost of about $150,000.

C&U said it will canvass the present Farmers Union subscribers to determine the type of service they desire and to establish rates later which would allow toll-free calling to some other C&U exchanges if the Farmers Union subscribers indicate a desire for such rights.

Grant Rate Increase To Minnesota Independent

The Minnesota Railroad & Warehouse Commission on Dec. 16 granted the Palisade Telephone Co. an annual rate increase of $2,591 to be effective with the conversion of the Palisade exchange to automatic operation.

The company showed a deficit of $342 in 1957 and under the new rates it is estimated that it will have a net income of $2,044. This will give the company a 5.3 per cent return on a rate base of $38,590 after the conversion of the Palisade exchange.

The Palisade company operates a total of 203 stations.

N. C. Central Telephone Proposes New Stock Issue

The Central Telephone Co. of Mount Airy, N. C., has advised the North Carolina Utilities Commission that Central's estimated cash requirements for construction, extensions and improvement in 1958 will be about $3,850,000.

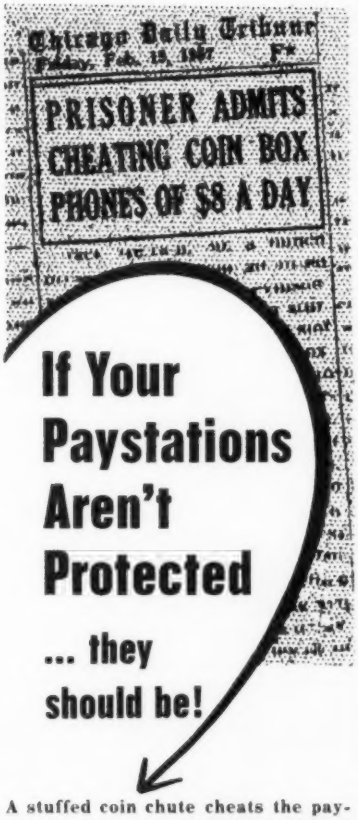
The company says net proceeds of a proposed issue of 27,000 shares of common stock, which it seeks to sell to its parent company, Central Gas and Electric Co. of Lincoln, Neb., will be used to apply against these requirements. In addition, it expects to issue and sell additional securities during 1958 to realize all or most of the balance.

The company, which maintains exchanges in 21 North Carolina communities, including Mount Airy, Asheboro, Draper, Leaksville-Spray, North Wilkesboro, Sparta and West Jefferson, proposes to sell the 27,000 shares of stock to its parent company at a price $1 per share less than the Jan. 9 bid price of $19.25 but not less than $17.50.

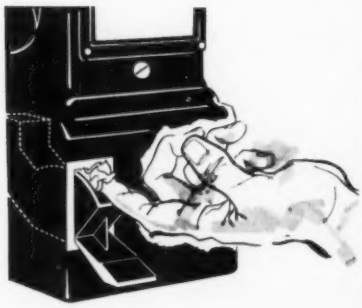
OK Sale of Minn. Independent

The Minnesota Railway & Warehouse Commission on Jan. 6 approved the

(Please turn to page 56)


Chicago Daily Tribune
PRISONER ADMITS CHEATING COIN BOX PHONES OF $8 A DAY
If Your Paystations Aren't Protected
... they should be!

A stuffed coin chute cheats the paystation user of refunded coins—and cheats you of customer good will! Automatic's Anti-Stuffing Coin Return makes this *impossible.* When it is closed, nothing can be inserted into the chute. When open, refunded coins are easily obtainable and the coin chute is blocked.



Automatic's Anti-Stuffing Coin Return fits both new and existing paystations. Write today for price and delivery information. Address: *Automatic Electric Sales Corporation, Northlake, Illinois. Or call FIllmore 5-7111.*

AUTOMATIC ELECTRIC

A member of the General Telephone System
One of America's great communications systems

New Autelco Paystation Offers Type 80 Telephone Features

Automatic Electric's new "80" series paystation has a familiar look to it. That's because it incorporates the outstanding features found in Automatic's famous Type 80 Desk Telephone.

Improved transmission is probably the most important feature of this paystation. The transmitter and receiver are non-positional, to help give lifelike reproduction of speech. Through the use of an entirely new induction coil and balancing network, the anti-sidetone balance has been greatly improved. This reduces sidetone, over a variety of line conditions, and causes the user to adjust his voice to the level which will give the most effective transmission. A simple adjustment enables the installer to adjust the line current for best transmission, whether line is short or long. This assures all-around efficiency on both local and long-distance calls.

Paystation users will particularly like the lighter, shorter handset of the "80" series paystation. Its lightness means it's far less tiring to hold, and the contours provide an easier grip. Because the handset is shorter, the user can talk directly into the transmitter and slightly to one side. This helps increase the volume and improves transmission quality. The receiver cap fits the ear better, too—helps reduce pickup of room noises.

Another popular feature of the AUTELCO paystation is its springy Koiled Kord. When this cord is extended, and then released, it instantly recoils into place. What's more, it won't ever kink or become knotted. The Koiled Kord is moisture-proof, as well.

FULL RANGE OF COLORS

To all these features the "80" series adds paystations in color. Many telephone companies find that this feature helps "sell" paystation installations in locations where black instruments are not acceptable. Paystations in color are perfect, for example, in beauty parlors, where women have plenty of time to converse. The AUTELCO "80" series paystation may be ordered in any one of 10 beautiful colors used on the Type 80 Telephone: Dawn Gray, Sand Beige, Sunlight Yellow, Turquoise, Camellia Pink, Forget-Me-Not-Blue, Gardenia White, Classic Ivory, Jade Green and Garnet Red. With this wide variety to choose from, you'll be able to select colors that blend or contrast with countless surroundings and help bring in additional revenue.

What a beauty! In this case we're referring to the new AUTELCO "80" series paystation, shown here in Classic Ivory. The paystation is available in 9 other colors and has the famous Type 80 Telephone features.

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Kellogg carries your line

Simple, Quick, and Sure!—For splicing two wires of different sizes, there's nothing simpler than using Nicopress reducing sleeves and the Nicopress 31-DC tool. Splices are always tight and strong. Made by the NATIONAL TELEPHONE SUPPLY COMPANY.

Splicers Fibre Test Boards, excellent quality. Used for classifying pairs when testing out cable. Numbers are easy to read and will not wash off. Made by J. FRANK MOTSON COMPANY.

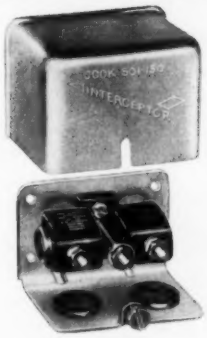
Dependable Power! Hundreds of telephone exchanges throughout the world attest to the low first cost, low operating cost, and thoroughly dependable service of Electrox Battery Eliminators and Chargers. Made by the SCHAUER MANUFACTURING CORP.

More Holding Power—Less Load per Blade!—The Chance 8-Way Anchor distributes the load all the way around the hole. Expands to form a complete pyramid shaped square. Made in sizes from 60 to 200 square inches in area. Made by A. B. CHANCE COMPANY.

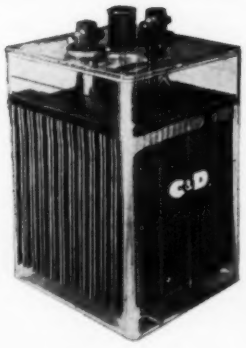
It is good business to have supplies available when you need them so that your linemen are not held up. But you do not have to tie up a large amount of capital. Kellogg will back up your inventory for you. Many operating companies rely on Kellogg to do this because Kellogg devotes more warehouse space to serving the Independent Telephone Industry than anyone else in the business The supplies are in stock waiting for you. Shipments are prompt. You get the supplies you want, *when* you want them!

supply inventories for you

Speed up Installation with one-piece, all aluminum, transposition brackets. Light weight, easy to handle and install. They come completely assembled in cartons of 20 brackets each and can be moved to job in original shipping cartons. Delivery 10 days from receipt of purchase order. PERMANENT MOLD FOUNDRY, INC.



The Cook Interceptor is a fuseless, carbon-to-carbon arrester which grounds power cross surges and lightning. Minigap or Mytigap arresters are mounted in a moisture-resistant and dirtproof receptacle. A product of COOK ELECTRIC COMPANY.



Extra-Long Life!—The suspended and supported plate construction is an exclusive feature of C&D BATTERIES. Choose C&D PlastiCal (lead-calcium grid) for life expectancy of 25 years . . . for 14 years expectancy, specify PlastiCell (high tensile lead alloy grids). Made by C&D BATTERIES, INC.

Corrosion-Resistant Crapo Stainless Steel Cable Lashing Wire, Type 430, is available in .045", .065", and .061" diameters. Crapo Galvanized (C Coated) Steel Cable Lashing Wire is available in .091" and .061" diameters. Made by INDIANA STEEL & WIRE CO., INC.

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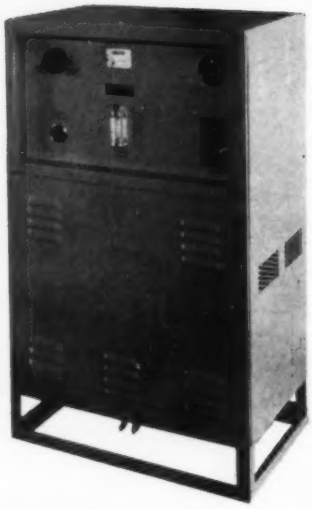
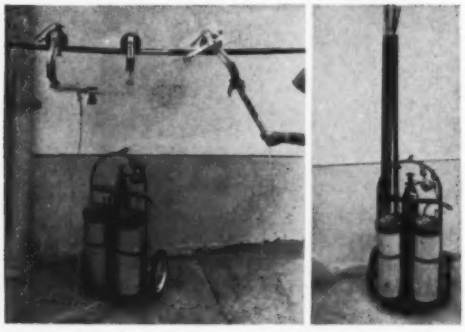
MODEL A
Air Compressor Dehydrator

Exchange equipment designed to supply chemically dry air for telephone cables, aerial and underground, this unit can supply as many as 30 cables. The unit is equipped with volume recording air meter, high and low pressure alarm switches, humidstat and hour meter.

- **Completely automatic in operation**
- **Air Purifier to eliminate oil mist**
- **Incorporates the latest safety devices**



LEAK DETECTOR APPLICATORS



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- **Safety Brackets—steel galvanized**
- **Nozzle and Piping—brass**
- **Liquid Line—heavy wall plastic tubing**
- **Liquid Tank—steel galvanized and brass fittings**
- **Wheel — nylon bearings, self-lubricating**

Applicators use a highly successful chemical type leak detector. Dual nozzles spray all sides of pressurized cable. Bubble cluster forms around leak within minutes and can be clearly seen from the ground. Air pressure bottle in cart supplies regulated pressure in solution tank at all times, can be adjusted for different height cables. For further information on this equipment, as well as the famous S & G Mobile Power Unit and Maintenance Generators . . .

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purchase of the Sandness Farmers Telephone Co. by the Home Telephone Co. of Clarkfield. The Sandness company operates in the vicinity of Cottonwood, which is an exchange of the Home Telephone Co.

Five Texas Exchanges Get Rate Increase

Five exchanges of General Telephone Co. of the Southwest increased their rates during the month of December, 1957.

All in Texas, the exchanges are:

Tahoka
CB Manual with EAS

	Old Rate	*New Rate*
Business, 1 party.....	$11.25	$12.50
Business, 2 party.....	9.50	10.50
Residence, 1 party.....	4.50	5.50
Residence, 2 party.....	3.75	4.75
Residence, 4 party.....		4.00

Beckville
Conversion to Automatic

Business, 1 party.....	2.75	9.50
Business, 2 party.....	2.75	8.00
Residence, 1 party.....	2.00	5.25
Residence, 2 party.....	2.00	4.25
Residence, 4 party.....	1.75	3.50

Bonham
Automatic

Business, 1 party.....	10.00	10.75
Residence, 1 party.....	4.75	5.25
Residence, 2 party.....	4.50	4.50
Residence, 4 party.....	3.50	4.00

Howe
Conversion to Automatic

Business, 1 party.....	4.25	8.50
Residence, 1 party.....	2.25	4.75
Residence, 2 party.....		4.00
Residence, 4 party.....		3.50

Mertzon
Conversion to Automatic

Business, 1 party.....	7.50	9.50
Business, 2 party.....	6.00	8.00
Residence, 1 party.....	3.50	5.25
Residence, 2 party.....	3.00	4.25
Residence, 4 party.....		3.75

Me. Commission Favors Highway Reimbursement

Chairman Thomas E. Delahanty of the Maine Public Utilities Commission told the state legislative appropriations committee on Jan. 14 that the commission favored reimbursing utilities for expenses incurred in accommodating interstate highway projects.

He testified before the committee on bills increasing the amount of state money available for the purpose and including municipally operated utilities under provisions of a 1957 act which

The call is for color

Brightest spots in today's modern offices . . . telephones in refreshing decorator colors! These attractive phones keep pace with the new trend in interiors . . . make telephoning more pleasant than ever! America's 4,400 Independent telephone companies provide up-to-date service like this throughout *two-thirds of the entire nation.* Modern, dependable communications for business and home . . . the finest in the world.

INDEPENDENT TELEPHONE COMPANIES

helping you reach all America

U. S. Independent Telephone Association
Pennsylvania Building, Washington, D.C.

This 42nd USITA national ad appeared in January 13 Time and January 24 U. S. News and World Report.

NEW,

IMPROVED DESIGN!

Extended mounting slot now fits ALL standard 12" or 8" pin spacings . . . eliminates costly re-boring.

Case® ALUMINUM CROSS-ARM TRANSPOSITION BRACKETS.

Many new carrier circuit designs call for a reduction in wire spacing from 12" to 8". Normally this means thousands of new pin holes must be bored . . . an expensive and time-consuming job. Now . . . the new, improved Case cross-arm transposition bracket with the extended mounting slot fits all standard 12" or 8" pin spacings . . . eliminates the need for costly re-boring, and saves you thousands of dollars per year. If you are planning to re-space and transpose wires from 12" to 8" spacings, be sure to check first with Case.

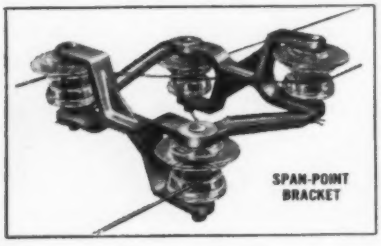
SOLD BY LEADING DISTRIBUTORS IN THE U. S.

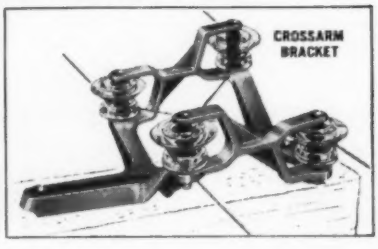
CASE BRACKETS . . . STRONG, LONG-LASTING, ECONOMICAL, ESPECIALLY ADAPTED FOR CARRIER-CIRCUIT CONSTRUCTION

Write today for free illustrated brochure.

TRANSANDEAN ASSOCIATES, INC.

305 MAIN STREET, ORANGE, NEW JERSEY





allowed reimbursement of privately-operated utilities. The federal government pays 90 per cent of this cost.

The 1957 Maine Legislature appropriated $25,000 for the current biennium to meet the state's share of the reimbursement, but cost analyses since actual construction plans have been available and inclusion of municipal utilities increased the figure to $43,000 needed each year for the state's 10 per cent share.

Terming the estimates submitted by the affected utilities "fair and reasonable" by commission standards, Mr. Delahanty said the "proposal appears to be a fair one."

If the utilities made the changes at their expense and collected a fair return, he said, the eventual cost to ratepayers would be "tremendous."

The total cost of such expenditures throughout the state on the basis of current state highway commission planning would approximate $859,953.

Others favoring the increased state appropriation included representatives of the Maine Municipal Association, Portland Gas Light Co., Central Maine Power Co., several municipal managers and representatives of water utilities.

Neb. Commission OK's Paystation Rate Increase

The Nebraska Railway Commission on Jan. 14 authorized the Farmers Telephone Co. of North Bend, to increase charges for local service from coin operated telephones.

The application of the Stanton Independent Telephone Co. for authority to increase rates was to have been informally considered on Jan. 30.

New Separations Manual Available from NARUC

The revised "Telephone Separations Manual," recommended for use by the state regulatory commissions at the National Association of Railroad & Utilities Commissioners convention in Memphis last October, now is available at $2.00 per copy.

Orders and checks should be sent to the National Association of Railroad & Utilities Commissioners, 5310 ICC Building, P.O. Box 684, Washington 4, D. C. The revised manual supersedes the 1947 manual, the 1952 addendum (Charleston Plan) and the 1956 addendum (Phoenix Plan). The revised Manual is the result of NARUC and FCC joint committee studies on the rewrite of the original Manual.

U. S. Chamber of Commerce Hits Excise Taxes

Early corrective action as regards "discriminatory and inequitable" excises on communication and transportation has been proposed to Congress by the Chamber of Commerce of the United States.

In a statement to the House Ways and Means Committee, the chamber pointed out that these "penalty" taxes discriminate between users of communication or transportation services located near major markets and those situated at some distance. Since taxes are based on the amount of fare or charge, the greater the distance the greater the discrimination.

Thus, the chamber said, the taxes deter industrial development of distant regions and so constitute a barrier to the free flow of trade.

The chamber also noted that excises are levied on our vital, publicly regulated communication transportation services, but not on private services. This, the chamber said, has encouraged continued expansion of uneconomic private transportation systems, to the detriment of our essential common carrier system.

The chamber concluded that the communication and transportation excise taxes "must be branded as grossly inequitable and should be placed on the list for early corrective action."

Lincoln Company Plans $1,750,000 Building Addition

A $1,750,000 addition to the telephone building by the Lincoln (Neb.) Telephone & Telegraph Co. has been announced by Thomas C. Woods, president of the company.

Vice President Merle M. Hale said that five stories would be added to the present three-story structure and that a four-story wing would be built to the east. Ultimately it is expected that this wing will be extended to eight stories to meet growth requirements.

The building program will add 110,000 square feet to the 45,000 square feet in the present structure.

New Link Connects Dacca, Pakistan With U. S.

A direct radio-telephonic link has been established between Dacca, Pakistan and the United States via Manila, according to Dacca postal authorities.

Messages can be exchanged by this new link, between 12 noon to 3 p.m. and between 8 p.m. and 11 p.m. daily.

Messages received beyond this period will, however, be transmitted as usual via Karachi.

MIKE THE MOLE SAYS:
Give the GUY a CHANCE
I get around... and I know that Chance Anchors really hold
YOU GET THE MOST FOR YOUR MONEY WITH CHANCE ANCHORS the most complete line
8-WAY EXPANDING
The guy load is distributed all around the anchor—no wasted space between blades. Usually installed in clay or loam.
NO-WRENCH SCREW
For hand or machine installation. Pitch-controlled blade goes down faster and adds to holding power in sandy soil, soft clay or loam.
NEVER-CREEP
Made of structural steel. Pulls entirely against solid, undisturbed earth. For extra heavy loads in clay or loam.
CROSS-PLATE
For heavy-duty anchoring in machine-bored holes. Holds better than logs or slugs. Saves time and money.
SWAMP SCREW
For swamps, marshes, quicksand, river crossings or seasonally flooded areas. Screws down deeply by adding sections of pipe.
8-WAY CONE
Acts as inverted wedge. Flaring base and flat faces increase wedging action. Used in rocky areas with rock wedging.
EXPANDING ROCK
No grouting necessary. The greater the pull, the tighter it wedges against solid rock. Set in 2" drilled hole.
WRENCH TYPE SCREW
All steel—double arc welded. Anchor hub absorbs installation strain. For light loads in sandy soil, soft clay or loam.
POLE KEY ANCHOR
Keys poles at the butt to reinforce them against unbalanced loads in soft soil. Ideal for congested urban areas.

Both the soil type and condition are important factors in determining the type of installation and the kind of anchors to use. That's why Chance Anchors are made in so many types and sizes. The anchors shown above are made in a wide variety of sizes. Each type is designed for certain soil and guying conditions. Each of these anchors will do its specific job better than any other anchor you can choose.

Good news for your guys! Get "Anchoring," the most complete anchor installation guide ever developed... it's FREE. Write today!
A·B·CHANCE CO·
CENTRALIA, MISSOURI
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WHITE ALICE

Continued from page 27

scale is grossly exaggerated in order to show both the curvature of the earth and the various elevations of the terrain between the two sites. By plotting profiles such as this one, based on data from large-scale topographic maps, it was possible to determine both the distance between sites and the horizon angles at each end of the path. Evaluating these factors made it possible to compute the long-term median path loss for each White Alice path.

Actually, of course, these computations were made for hundreds of paths between potential site locations which were later discarded for various reasons. It was found that where map accuracy was reasonably good, the computed path losses obtained by this method were in fairly close agreement with path loss measurements made later on.

Unfortunately many of the maps of Alaska were not sufficiently accurate for this purpose. It was determined, however, that dependable predictions of path loss could be made by having the siting engineers measure the horizon angles at the time they inspected each potential site for adequate size and construction feasibility. Path loss computations based on measured horizon angles at the sites proved to be very reliable.

The lower portion of *Fig. 5* shows a recording of the propagation variations of a typical beyond-horizon path over a period of about 2½ hours. It can be seen that the signal fluctuates rapidly over a range of 5 to 10 db. Further, these fluctuations are superimposed on a longer term of variation in propagation of about 10 db. This type propagation is characteristic of beyond-horizon paths and requires that some sort of summarizing or establishment of median values be made in order to evaluate long-term performance. White Alice path measurements were normally conducted over a period of two weeks. This interval appeared to furnish sufficient data to establish reliable median values.

Diffraction or Knife-Edge Path. A special type of beyond-horizon radio path called a diffraction or knife-edge path is shown in *Fig. 6*. Several paths of this type have been employed on the White Alice project. On a straightforward beyond-horizon computation a diffraction path would be far out of limits because of the excessive horizon angles at both ends. It can be seen, however, that a single obstruction, visible from each end of the path, is responsible for both horizon angles. On paths of this sort, propagation computations based on free space loss, plus the loss due to shadowing by the obstruction, appear to most nearly agree with path losses measured in the field. The actual losses encountered were typically about 20 to 30 db less than beyond-horizon predictions based on distance and horizon angles. As shown in the lower portion of *Fig. 6*, the characteristic beyond-horizon rapid fluctuations in propagation tend to be greatly diminished in the case of knife-edge paths, although the received signal level is still far from a constant value.

Use of Diversity Transmission

Diversity is frequently employed for improving radio system noise and reliability. Dual space diversity is used on all White Alice beyond-horizon paths for this purpose. The method requires four antennas for each path—two at each end. A radio link without diversity is shown in the upper chart of *Fig. 7*. By means of suitable diplexing arrangements a single antenna at each end can be used both for transmitting and receiving. The lower diagram in *Fig. 7* shows how such a link can be converted to diversity reception by adding a second antenna and receiver at each end.

The first effect of such an arrangement is, of course, that twice as much of the incoming signal is intercepted, since two receiving antennas are being used in place of one. The second—and even more important effect—is that fading of the signals received by each of the two antennas seldom occurs at precisely the same instant of time.

In some radio systems the outputs of the two diversity receivers are connected to a switch which automatically selects the receiver having the higher signal level at any given instant. This arrangement has the disadvantage, however, that transients are introduced by the action of the diversity switch.

In White Alice, a combiner network is used in place of the diversity switch. The combiner makes use of the fact that the noise outputs of the two receivers add in random fashion while the signals add linearly. It is, therefore, possible to combine the receiver outputs to provide a better signal-to-noise ratio than can be obtained on a single receiver under all fading conditions.

Antennas at Diversity Sites. A sufficient distance, depending upon the operating frequency, must be provided between the two antennas for effective diversity action. Antennas on the White Alice project—operating in the range of 700-1,000 megacycles—are spaced a minimum of 200 feet in all cases. As shown by the dotted lines, the diversity antennas are arranged to permit transmitters to feed them if desired. This allows greater flexibility in the event of damage to an antenna or its transmission line and also allows simultaneous feed of both antennas if desired.

Sixty-foot diameter antennas were specially designed for the White Alice project by the Blaw-Knox Co. in conjunction with Bell Telephone Laboratories. These antennas were built to withstand winds of up to 150 miles an hour and up to 16 radial inches of ice, and required a structure weighing over 100 tons.

After due consideration, it was decided that beam orientation movements of such a structure would be impractical after it was constructed. For this reason, all of the survey and antenna erection work was performed to an unusually high degree of accuracy. The base lines established by survey at the sites were made to an accuracy of better than ±5 minutes of arc. Similar close tolerances were used in pouring antenna foundations, setting the anchor bolts and in the erection of the antenna itself.

It was felt that these tolerances were good enough to permit elimination of the possibility of adjusting the orientation of the antennas, once they had been erected. It appeared, nevertheless, very desirable to protect—even to a small degree—against unforeseen errors that might occur.

The top diagram of *Fig. 8* shows the conventional method of orienting an antenna by means of physically rotating or moving the antenna itself. Orientation is accomplished in the White Alice 60 foot antenna, as shown in the lower diagram, by moving the feed horn relative to the parabolic reflector. The available range of feed horn adjustment produces a maximum of ± 1 beamwidth deflection (slightly over 1°). With orientation limited to this small amount, the slight defocussing or squinting of the antenna which occurs results in no significant loss of gain.

Typical Beyond-Horizon Repeater Station

Fig. 9 shows a simplified block diagram of a typical beyond-horizon repeater station. The radio equipments and arrangements are the same on each side of the multiplex equipment. Tracing first a transmitting path, telephone and telegraph channels toward

BUYING-SELLING OF TELEPHONE COMPANIES IS OUR BUSINESS

We have clients who will buy.

We have clients who will sell.

We have investment sources that will finance all phases of such transactions.

We'll come to your home town with an assurance that we can be helpful in any situation.

All inquiries treated confidentially, of course.

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Negotiators for the Purchase, Sale and Financing of Independent Telephone Companies

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CHICAGO
35 East Wacker Dr. RAndolph 6-6760

DENVER
1700 Broadway AComa 2-3623

the east are fed into the multiplex equipment where they are combined and introduced into the beyond-horizon exciter or low-power transmitter. The output of the exciter feeds the power amplifier which is so arranged that it can be patched to either one of two branching filters, and thence to an antenna.

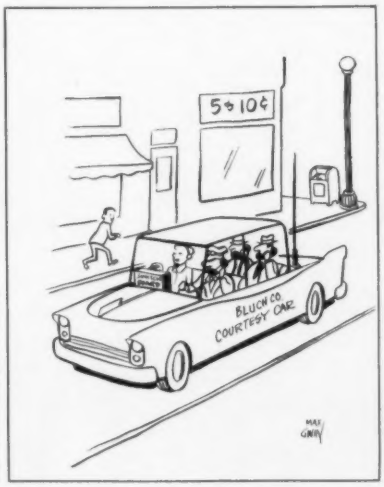
The received signals coming in from the east on both antennas are kept separate from the transmitter by the branching filters and are each connected to the input of an identical receiver. The receiver outputs are combined by the combiner network and the single output is connected to the multiplex equipment which separates out the individual telephone and telegraph channels. A similar process can be traced for the paths to the west.

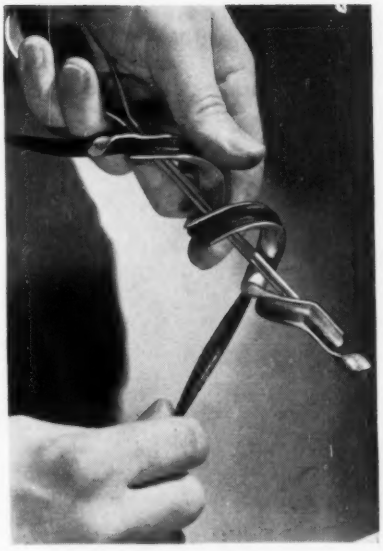
System for the Last Frontier

The interior of Alaska is still very much a frontier in many respects. With the exception of Anchorage—a modern city of 60,000 people—all of her towns are small. Paved roads are almost unknown. In most places, the villages are built around the only possible source of travel and news—the airstrip.

The airplane has indeed been the covered wagon of the far north. But there is another element necessary to its full development and that is rapid, reliable communication. Everyone knows the historic role the pony express and later, the telegraph—paralleling the railroad—played in the development of the American West.

It is our hope that White Alice may be an important influence in the future development of this last frontier—that by spanning the miles of Arctic wilderness quickly and dependably it may become a major factor in linking the people and fulfilling the destiny of Alaska.





Wire-Saving Snubbing Action . . . with this KEARNEY

SNUB-R-GRIP DROP WIRE GRIP

On poles or buildings this free-swinging drop wire tie provides a "snubbing" action stronger than the rated strength of the wire. This is possible because the unique spiral grip distributes the pull over a long length of wire. KEARNEY Snub-R-Grips are quickly installed and easily salvaged. Just wrap the wire (twisted pair, parallel or synthetic-jacketed) into the grooved spiral. A portion of the groove's inner surface is specially coated to give maximum non-slip grip . . . without damage to insulation.

For Better Construction . . . Safer Maintenance

Specify 268

KEARNEY PRODUCTS

4224-42 Clayton Ave. • St. Louis 10, Mo.
Canadian Plant: Guelph, Ontario

Traffic Questions

Concluded from page 28

(1) When an "A" operator receives an order by number and the customer adds "only" to the order, how does the operator proceed?

(2) When a local operator refers a call to her supervisor on which a customer has added "only" to his order for a number, what explanation is made by the supervisor?

(3) If the customer is not satisfied with the explanation given in answer to question No. 2, what further action is taken by the supervisor?

(4) If a local operator receives an order on which the customer abbreviates the office name by giving the first two letters and the office numeral, what action is taken by the operator?

(5) If a local operator receives a call by name for the fire or police department, should the call be accepted by name even though no emergency is claimed?

Answers are presented on page 70.

Illinois Bell Names Two Division Chiefs

Illinois Bell Telephone Co. recently named R. E. Ransom and Joseph H. Johnson to head two of its divisions. The promotions are effective Feb. 1.

Mr. Ransom, employe information supervisor, will be division traffic manager for the north shore division.

Mr. Johnson, executive assistant to Illinois Bell President W. V. Kahler, will be upstate division commercial manager.

Mr. Ransom joined Illinois Bell in 1936 after graduation from Northwestern University. Mr. Johnson joined the company in 1946.

New York Students Are Taught Telephone Etiquette

Students in New York City's junior high schools will be taught how to speak well on the telephone according to an Associated Press report.

As part of their training in English class they will also hold their own in-group discussions and will be helped to acquire good taste in choosing and enjoying the best of television.

The course will also include the standard English curriculum subjects of spelling, grammar and reading.

Obituary

CURTIS R. HANSON, 56, president and manager of the Scandinavia (Wis.) Telephone Co. died recently.

Shown above are the honored guests of L. M. Berry & Co.'s 25-year banquet as they display the watches received in recognition of long service. Left to right: W. A. Steuer, general manager; H. C. Hull, statistician; R. A. Maner, Florida division manager; Agnes Herbst, general office; Geraldine Lively, general office; W. J. Henneberry, Ohio division; E. C. Longstreth, Ohio division; F. L. Hawker, Eastern manager. Not shown: J. P. White, Southern manager.

L. M. Berry & Co. Honors 25-year Employes

Nine employes having service of 25 years or more were honored on Dec. 6 by L. M. Berry & Co. of Dayton, O. Loren M. Berry, founder of the company, presented each with a gold watch and a certificate of service.

Receiving recognition for long service to the company and directory advertising were W. A. Steuer, H. C. Hull, Mrs. Fred Herbst, Miss Geraldine Lively, E. C. Longstreth, and W. J. Henneberry, all of Dayton; J. P. White of Louisville, Ky.; F. L. Hawker of Rochester, and R. A. Maner of Tampa.

Mr. Steuer, general manager, who will observe his 30th service anniversary in March, joined the company in 1928 as an accountant in the general office. He was appointed general manager in 1941.

Mr. Hull joined the firm in 1929, and will mark 29 years of service in January. After serving in various sales, management, and administrative positions for a number of years, he was named company statistician in 1952.

Mrs. Herbst was employed as a general office secretary in 1927, and observed her 30th service anniversary on last Oct. 15. Since 1941 she has served as secretary to Mr. Berry.

Miss Lively joined the accounting department in 1932, and has been a member of the Trade Mark Department since 1951. She will observe 26 years with the company in January.

As a member of L. M. Berry & Co. for 31 years, Mr. Longstreth was employed in August 1926. Mr. Henneberry joined the company in 1929, and will mark his 29th anniversary in January. Both men have served in sales and supervisory capacities throughout much of the company's operations in 29 states, and for the past several years have been assigned to the Ohio sales division.

Mr. White, southern manager of the company's telephone directory advertising activities, joined the firm in Louisville in 1920 as a salesman. After serving in sales and supervisory capacities throughout much of the company's operations, he returned to the Louisville office in 1936. He was named southern manager on July 1, 1947. In this capacity he directs the activities of five southern sales divisions, which handle the directory advertising work for the Southern Bell Telephone & Telegraph Co. in Kentucky, Tennessee, Alabama, Louisiana, and Mississippi.

Mr. Hawker, eastern manager of the company's operations, joined the firm in 1932. He will observe his 26th service anniversary on May 14. After serving in various sales and supervisory capacities, he was transferred to Rochester in 1934, where he was promoted to eastern manager in November 1942. He directs the efforts of three sales divisions having operations in New York, Pennsylvania, Vermont, Virginia, West Virginia, the Carolinas, and Eastern Tennessee.

Mr. Maner, manager of L. M. Berry & Co.'s Florida division, joined the firm in Tampa as a directory advertising salesman in 1931 and will observe his 27th service anniversary in April. He served as a salesman and supervisor in various territories until 1941, when he returned to Tampa as a district manager. He was appointed Florida division manager in 1947. The Florida division handles the directory advertising for nine Florida telephone companies.

An Ohio contractor reports it used to take 4 men to dig in hard dry dirt or soft rock with a competitive digger operating from power take-off equipment. The EXTRA MEN were needed to ride the digger. Now, with a Roper automatic hole digger (no PTO needed) on the job only one man is needed for guidance, not for brawn. The report continues "I have dug 29 pole holes 14" in diameter 5 feet deep in only 3 hours with my Roper."

If you're looking for the fastest, most dependable digger on the market, check the Roper. It digs a straight or angle hole from any truck, jeep or tractor equipped with front or rear boom and winch. Prices and specs on request. Write today.

Standard unit depth 6 ft. Maximum digging depth 25 ft.

ROPER Roper Manufacturing Company 250 Elm St., Zanesville, Ohio

SAVES THE WORK OF 3 MEN DIGS 29 HOLES IN 3 HOURS

Distributed by Graybar

Ask your Graybar representative about the Roper automatic hole digger!

Say mister, is this pole gonna be here from now on?

Maybe not from now on, but it will last for years and years. That is unless it's struck by lightning or something. This is a T-C pressure treated pole. T-C's pressure treatment makes 'em last. Our company uses T-C poles all the time. We found they last . . . almost from now on.

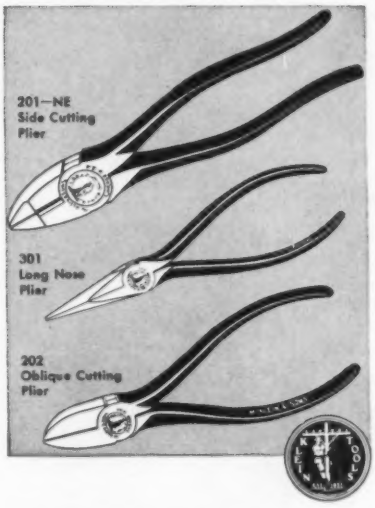
Distributed by
AUTOMATIC ELECTRIC SALES CORP.
AND LEICH SALES CORP.

TAYLOR-COLQUITT TIMBER CONSERVATION T-C

TAYLOR - COLQUITT CO.
SPARTANBURG, SOUTH CAROLINA

PLANTS AT SPARTANBURG, SOUTH CAROLINA AND WILMINGTON, NORTH CAROLINA

KLEINS



Standard of the Industry for Over a Century

Ask the lineman on the pole . . . the electrician at the switchboard. They will tell you that the pliers they rely on are Kleins—every time.

Kleins have been serving the electrical industry since the first wires were strung and today have the same high quality, the same fine craftsmanship, the same individual inspection and testing that have won them their place for a century as first in pliers.

A wide variety of sizes and styles to meet any need . . . but only one quality—the highest.

ASK YOUR SUPPLIER

Foreign Distributor:
International Standard Electric Corp.
New York

SEND FOR NEW POCKET TOOL GUIDE

100 years of service to linemen, electricians and industry is back of this new Pocket Tool Guide No. 100. A copy will be sent to you upon request, without obligation.

Mathias KLEIN & Sons
7200 McCORMICK ROAD • CHICAGO 45, ILLINOIS

President Eisenhower sets the cornerstone of the new AEC headquarters building near Germantown, Md. Participants are (left to right) John A. Derry, AEC director of construction and supply, Rep. C. T. Durham, chairman, Joint Committee on Atomic Energy of Congress and L. L. Strauss, AEC chairman.

History of AEC Preserved On Microfilm

Four rolls of 16mm microfilm, containing 9,000 pages of historical documents on atomic energy, represent the bulk of printed matter in the cornerstone of the new Atomic Energy Commission headquarters, near Germantown, Md. President Eisenhower officiated in laying the cornerstone recently, assisted by Lewis L. Strauss, chairman of the Commission and Rep. Carl T. Durham of North Carolina, Chairman of the Congressional Joint Committee on Atomic Energy.

The documents represented the developments of the United States Atomic Energy Commission and the Manhattan Engineer District. Included in the microfilm records was the Tenth Anniversary issue of *Nucleonics*, September 1957. The special issue in this the decade year of the commission contained a dedication editorial by Lewis L. Strauss and 22 feature articles on atomic subjects by leading nuclear authorities of the world.

The historical documents and the magazine pages were photographed in the Washington microfilming laboratories of Recordak Corp., subsidiary of Eastman Kodak Co. The documents were reduced 20 times their original size on the 16mm film.

Phelps Dodge Announces Executive Appointments

The election of Edgar P. Dunlaevy as executive vice president of Phelps Dodge Copper Products Corp., and S. Allan Jacobs as president of the concern's Inca Manufacturing Division in Fort Wayne, Ind., was announced on Jan. 8. Dunlaevy and Jacobs also were made directors of the corporation.

John J. Conlon, William K. Dunbar Jr. and Earle A. Mitchell were elevated to vice president at the Jan. 8 meeting of the board of directors.

Charles F. Moody was named works manager of the Habirshaw Cable & Wire Division in Yonkers, N. Y., and Lewis F. Buckman is the new works manager of the Bayway Division in Elizabeth, N. J.

Mr. Dunlaevy has been a vice president since 1949 and Mr. Jacobs since 1941, which office he continues to hold in addition to his new position.

Mr. Mitchell has been works manager at the Habirshaw Division, and Mr. Moody has been chief plant engineer at Habirshaw.

Mr. Conlon started with Phelps Dodge in the tube mill of the Bayway Division in 1935 in charge of the cost department, was named production manager in 1939, general superintendent in 1952 and works manager in 1953.

Mr. Dunbar started in the sales department of the Habirshaw Division in 1930, later was transferred and subsequently became sales manager of the American Copper Products Division and in 1952 became manager of distributor sales for the company.

Mr. Buckman joined the company in December 1947 as assistant production manager of the Bayway Division, was named production manager in 1952 and assistant works manager in 1953.

Stromberg Appoints Pouk to Chicago Industrial Sales

Ralph W. Pouk Jr., of Stromberg-Carlson's Chicago branch office, has been appointed industrial sales representative in that area, according to an announcement by Edgar R. Sears Sr., manager of industrial sales of the company's Telecommunication Division. Stromberg-Carlson is a division of General Dynamics Corp.

In his new capacity Mr. Pouk will represent Stromberg-Carlson's industrial sales department in the Central States area. In this position he succeeds Milton Ferry, who is returning

Looking for:

● Service ● Reliability ● Nationally Known Telephone Supplies

?

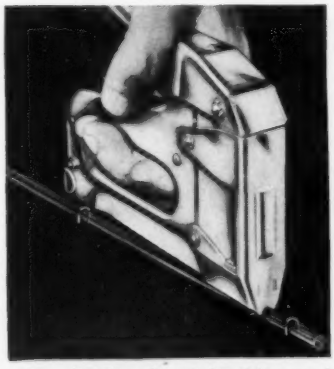
Then look to Lindsay, where prompt delivery of your order as specified is assured by fast, efficient, *personalized* service . . . backed by extensive warehousing of nationally known telephone supplies. Established in 1939, Lindsay is under second-generation management that believes a business can go only one way—forward.

LOOK TO THE LEADER . . . LOOK TO LINDSAY

THE LINDSAY TELEPHONE SUPPLY CO.
10409 Meech Ave., Cleveland 5, Ohio
Telephone Diamond 1-9212

SAVE! Arrow's T-25 Staple Gun Saves You Time and Money!

For Wire Up To ¼" in Diameter . . . Bell, Thermostat, Radiant Heat, Telephone, Inter-com, Burglar Alarm, etc.



Tapered striking edge gets into tight corners!

T-25 AUTOMATIC STAPLE GUN *for wires up to 1/4" in diameter. Uses 3/8", 7/16" and 9/16" round crown staples, galalloy coated for high rust resistance.*

LIST $15.

SAFE!
Can't damage wire because staples automatically stop at right height! Won't even break ¼" hollow glass tubing.

FAST!
Proved by test 6 times faster than old hammer method. Saves you 70% in fatigue and efficiency . . . saves many dollars a year.

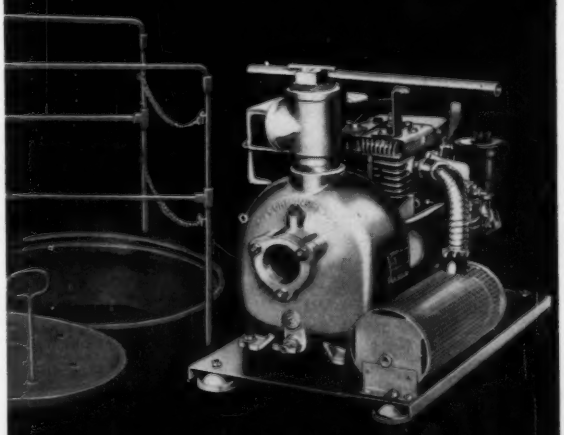
HOLDS!
New staples get tremendous holding power from tack points that spread to lock themselves into wood!

Write for catalog and information.

ARROW FASTENER CO., INC.
ONE JUNIUS STREET, BROOKLYN 12, N.Y.

GORMAN-RUPP DEWATERING PUMPS

equipped with muffler and hand throttle for quiet zones



THE GORMAN-RUPP COMPANY
Mansfield, Ohio

TELE-MUFF Jr.

The Head Set Ear Cushion
Designed Especially for Switchboard Operators

Made of Soft Pliable Vinyl Foam

- **Easy on Ear**
- **Inexpensive**
- **Attractive**

Write for Details

Thanks for your splendid response. All orders being shipped promptly.

TELE-MUFF CO.
Box 832
San Fernando, Calif.

to Rochester for a new assignment with the industrial sales group.

Stromberg-Carlson's industrial sales department supplies dial and manual telephone equipment of all types to meet the requirements of industrial or commercial organizations having their own private communication systems. It also provides wire line carrier, and multiplex equipment used with microwave systems, for utility and pipeline companies; components such as relays, switches, jacks, plugs and keys to manufacturers of various types of data control and data processing units, and other related items in the fields of communications and circuitry.

Mr. Pouk joined Stromberg-Carlson's Chicago office in 1946 as order editor, and subsequently became office manager, and later manager of supply sales for the Chicago branch.

In these positions Mr. Pouk traveled extensively contacting customers to determine their requirements, and also worked closely with outside suppliers of those items which supplement the regular Stromberg-Carlson products. In this work he gained experience in many of the types and applications of electromechanical and electronic equipment required by modern industry.

A native of Chicago, Mr. Pouk attended Lyons Junior College and Northwestern University. During World War II he served three years in the U. S. Air Force, two of them in combat operations in England.

R. W. POUK JR.

Graybar Names Kirkpatrick Central District Manager

W. E. Henges, president of the Graybar Electric Co., Inc., announced that C. E. Kirkpatrick formerly Erie district manager at Cleveland was transferred on Jan. 1 to Chicago to become central district manager.

Mr. Kirkpatrick joined the company in 1936 as quotation clerk at San Francisco. In the same year he transferred to Salt Lake City as a salesman.

In 1940 he became district lamp and lighting manager at San Francisco. Upon return from military leave in 1945, he was appointed manager at Albany, and three years later was transferred to Memphis in the same capacity.

In 1950, Mr. Kirkpatrick was appointed Erie district manager at Cleveland, the position he held until his current transfer.

In January, 1957 he was elected a director of the company.

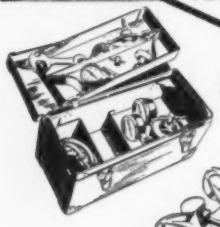
Ramset Appoints New District Sales Managers

The appointment of eight new district sales managers has been announced by James J. Clarke, sales manager of Ramset Fastening System, Cleveland. The changes were made as part of a realignment of responsibility. All eight men were associated with Ramset before their new appointments. Ramset is a part of Olin Mathieson Chemical Corp. and manufactures the Ramset powder-actuated fastening tool and the Shure-Set hammer-in tool.

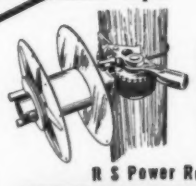
D. W. Champlin is responsible for

GENERAL MACHINE PRODUCTS COMPANY, INC.
Old Lincoln Highway at Pa. Turnpike, Trevose, Pa.

Aerial Tents
Cable Benders
Cable Blocks
Cable Lashers
Coaxial Cable Tools
Lashing Wire Clamps and Grips
Portable & Power Reels

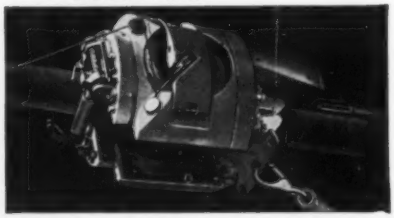


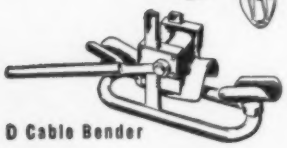
Pressure Testing Kit



R S Power Reel

C R Power Reel





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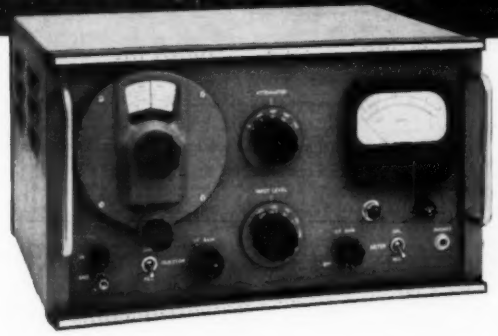

Sierra 121A Wave Analyzer is a double superheterodyne receiver covering 15 KC to 500 KC. It provides data directly in volts and dbm at 600 ohms, and offers high selectivity required for single sideband carrier measurements.

Sierra 158A Wave Analyzer is similar to Model 121A but covers 500 KC to 10 MC.

Both instruments have ±2 db accuracy, spurious response at least 50 db down, and signal measurement range of 77.5 μv to 97.5 volts. Available for either cabinet or relay rack mounting.

Frequency-selective carrier-frequency voltmeters

For carrier frequency and other field or laboratory work between 3 KC and 800 KC, Sierra offers five accurate, stable tuned vacuum tube voltmeters. All are direct reading in voltage and dbm at 600 ohms from —80 dbm to +42 dbm. All feature built-in calibration oscillators, level calibration circuits, aural monitoring jacks, and (except 103B) precision spiral scale dials. All are ruggedly constructed of quality components for long operating dependability.

SPECIFICATIONS — SIERRA VOLTMETERS

Model	Frequency Range—kc	Selectivity		Accuracy		Direct Reading in dbm	
		Down 3db	Down 45db	Frequency	Measuring	Balanced	Unbalanced
101C	20-500	± 550 cps	± 2900 cps	Note A	± 3 db	Note D	600 ohms
103B†	3- 40	± 400 cps	± 3000 cps	± 0.5 kc	± 3 db	Note D	600 ohms
104A	5-150	± 300 cps	± 1500 cps	± 1 kc	± 3 db	Note D	600 ohms
108B	15-500	± 550 cps	± 2900 cps	± 3 kc Note B	± 2 db Note C	135 ohms Note D	600 ohms
114A	100-800	± 550 cps	± 2900 cps	Note A	± 3 db	Note D	600 ohms

† Contains carrier re-insertion oscillator for monitoring suppressed carrier systems. Furnished with planetary drive dial. Note A. Ranges from ± 2 KC at low end of dial to ± 3 KC at upper end. Note B. ± 1 KC in the 48 KC to 256 KC region. Note C. ± 1 db for + 30 db to —40 db attenuator steps on 135 ohm balanced measurements. Note D. All models may be converted for 135 and 600 ohm balanced line measurements by convenient plug-in bridging transformer, Model 130D.

Data subject to change without notice.

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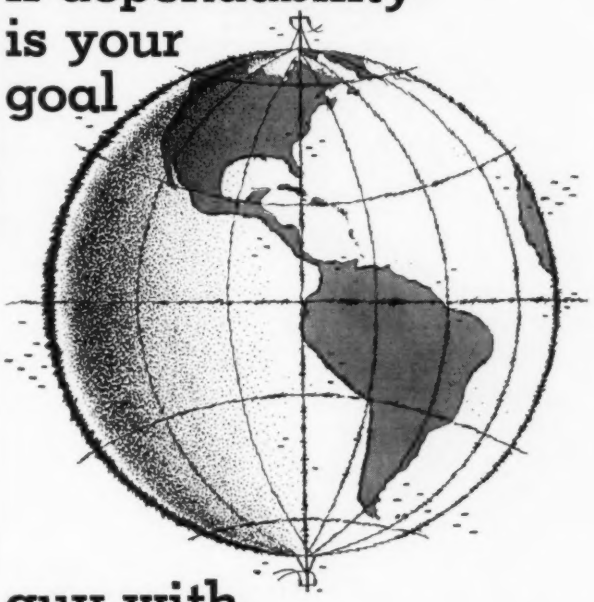

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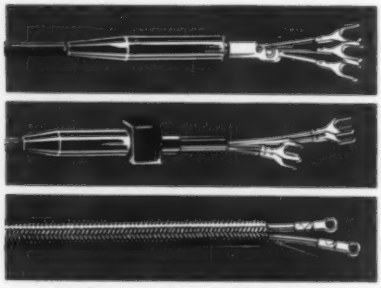

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R. E. Mullis will cover eastern Tennessee, North and South Carolina, and Georgia.

S. F. Nicholas Jr., is responsible for sales in New York, Connecticut, and Rhode Island.

FTL Opens San Fernando, Cal. Research Laboratories

The new one-story, fully air conditioned laboratories building recently completed by Federal Telecommunication Laboratories (FTL), largest research and development division of International Telephone & Telegraph Corp., is located in San Fernando, Cal., and provides facilities and equipment to conduct very exacting research and development activity.

Three unusual types of working area have been provided: (1) a super-clean area for assembly and testing of micromechanical devices such as gyroscopes or other inertial navigation devices; (2) a vapor-controlled area whose atmosphere is drawn from a 40-foot tower to minimize contamination by automobile exhaust vapors, then treated to accurately control all its vapor content, including, especially, vapors from experiments in adjacent areas; and (3) a "universal" area which is quickly convertible from private to semi-private offices to flexible and efficient electronic laboratories.

In addition to these three types of working areas, the radiation laboratory includes the most modern special-purpose rooms for such functions as vacuum-tube assembly, leak testing, phosphor settling, hydrogen furnace operation and vacuum deposition.

The 22,400-square-foot building incorporates five unique features which may be precedent-setting for future laboratories. One such feature is the provision for an oscilloscope room separate from the super-clean rooms, but communicating therewith by means of a viewing window, plus a set of remote control panels carrying electrical cables and remote control shafts. Thus, oscilloscopes, voltmeters and other inherently dirty electronic test equipment can be used by engineers in the super-clean room without bringing such test equipment physically into the super-clean areas.

A second feature is the use of double walls between different project rooms in the vapor-controlled area with low-pressure air spaces between the walls to prevent the flow of even a few molecules of vapor from one room to another.

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Federal Telecommunication Laboratories' new 22,400-square-foot building in San Fernando, Cal., provides research and development facilities and equipment to conduct very exacting types of scientific activity.

AE Assigns Arnold to Italy; Collins New Carrier Chief

Jack B. Arnold who has been with Automatic Electric Co. since 1948 has accepted an important new position with Automatic Electric International's affiliated manufacturing organization in Milan, Italy. He has been succeeded

J. B. ARNOLD

as manager of the Carrier and Radio Division of Automatic Electric Sales Corp. by Tate B. Collins Jr.

Mr. Arnold, following a training

T. B. COLLINS JR.

period in Chicago, had previously served some five years as a staff engineer in the Rome, Italy office of Automatic Electric International. He was named manager of the Carrier and Radio Division of Automatic Electric Sales Corp. in Chicago in 1956.

Mr. Collins joined Automatic Electric in 1952 after 12 years with Southern Bell Telephone & Telegraph Co. Since 1956 he has been assistant manager of the Carrier and Radio Division.

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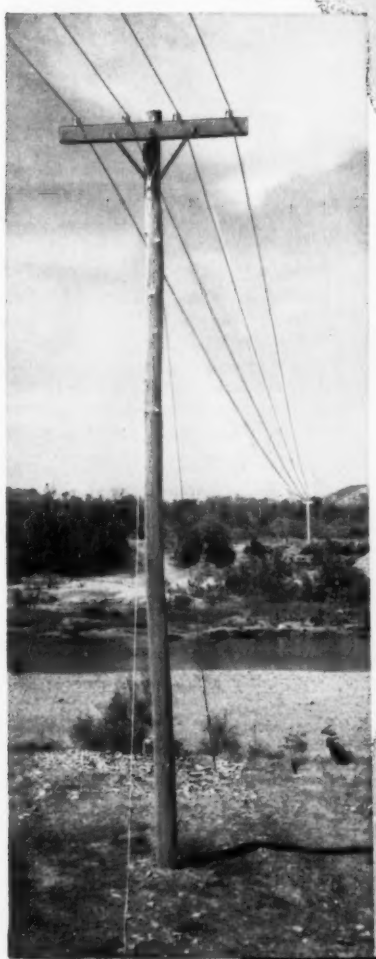

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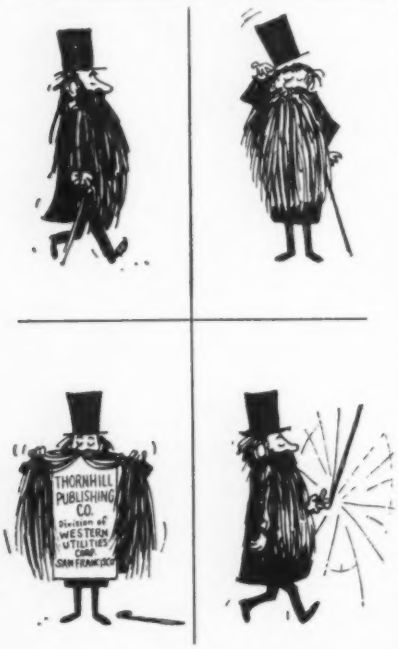

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Chafee Named President Of Ansonia Wire & Cable

Emmet G. Gardner, chairman of the board of The Ansonia Wire & Cable Co., Ashton, R. I., announced that John S. Chafee of Providence has been

J. S. CHAFEE

elected president of the company. He will fill the vacancy caused by the resignation of Alden P. Lunt.

Mr. Chafee attended Brown University and has had long executive experience in industry, including service with Brown & Sharpe Mfg. Co., Saco-Lowell Shops, Metals & Controls Corp., and B-I-F Industries, Inc. During World War II, he was director of the tools division of the War Production Board.

He is a trustee of the Butler Health Center of Providence.

The Ansonia Wire & Cable Co. manufactures plastic insulated wire and cable.

Answers to Questions On Page 62

(1) The operator will refer the call to her supervisor.

(2) The supervisor will explain to the customer that special operating procedures are not possible on "after hour" calls to auxiliary groups and that calls received during all hours are completed in the same manner. If it seems advisable, the supervisor will explain the method of completing calls to auxiliary groups.

(3) If the customer is not satisfied, the supervisor will advise him that there are certain equipment arrangements that may be possible and will refer the customer to the business office.

(4) The operator will check her bulletin and, if the first two letters and the office numeral are correct, she will acknowledge and proceed with the call.

(5) Yes.

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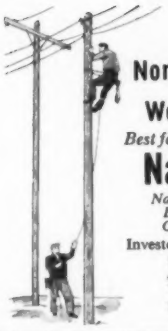

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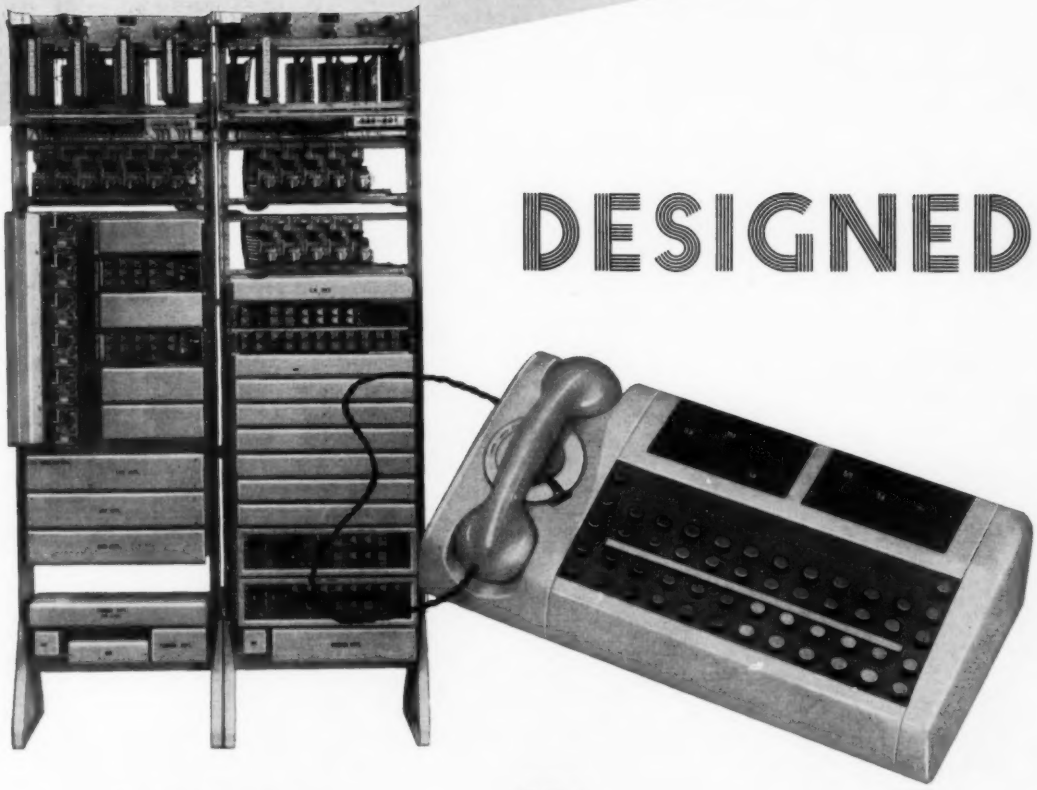

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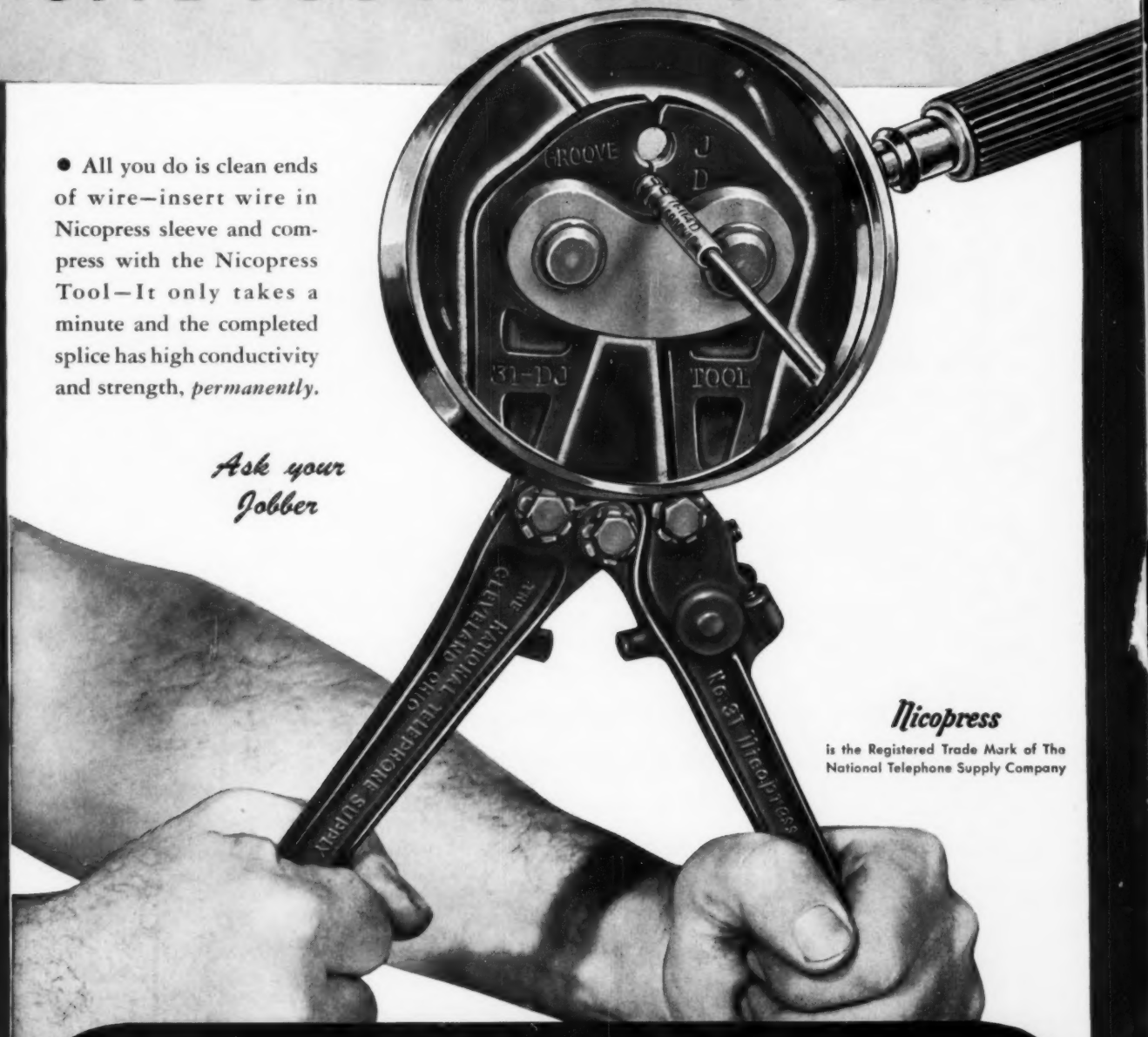

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